Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan

for the

Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers

WOOD - PAWCATUCK
Wild and Scenic Rivers

WOOD-PAWCATUCK
WILD & SCENIC
STUDY COMMITTEE

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June 2018

Wood-Pawcatuck Wild and Scenic Study Committee
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The logo for the Wood-Pawcatuck Wild and Scenic Study was designed by Richard Seager.
Cover photo credits: Elise Torello

Table of Contents

List of Figures

List of Tables

"We are never far from the lilt and swirl of living water. Whether to fish or swim or paddle or only to stand and gaze.... All of us are drawn to rivers.... We need their fluent lives interflowing with our own."Furthermore,"Rivers are places that renew our spirit, connect us with our past and link us directly with the flow and rhythm of the natural world." "Like a trusted friend, a river shares its attributes unconditionally."

Respectively, John Daniel,Ted Turner and J.L. Leigh

Questions and Contact Information

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This Plan is also available on our website www.WPWildRivers.org (and once a final draft is produced, hard copies will be made available in the Town Clerks' offices and town libraries). Additional information and requests for electronic copies of this plan are available from our website www.WPWildRivers.org or by sending a request to WPWildRivers@WPWA.org.

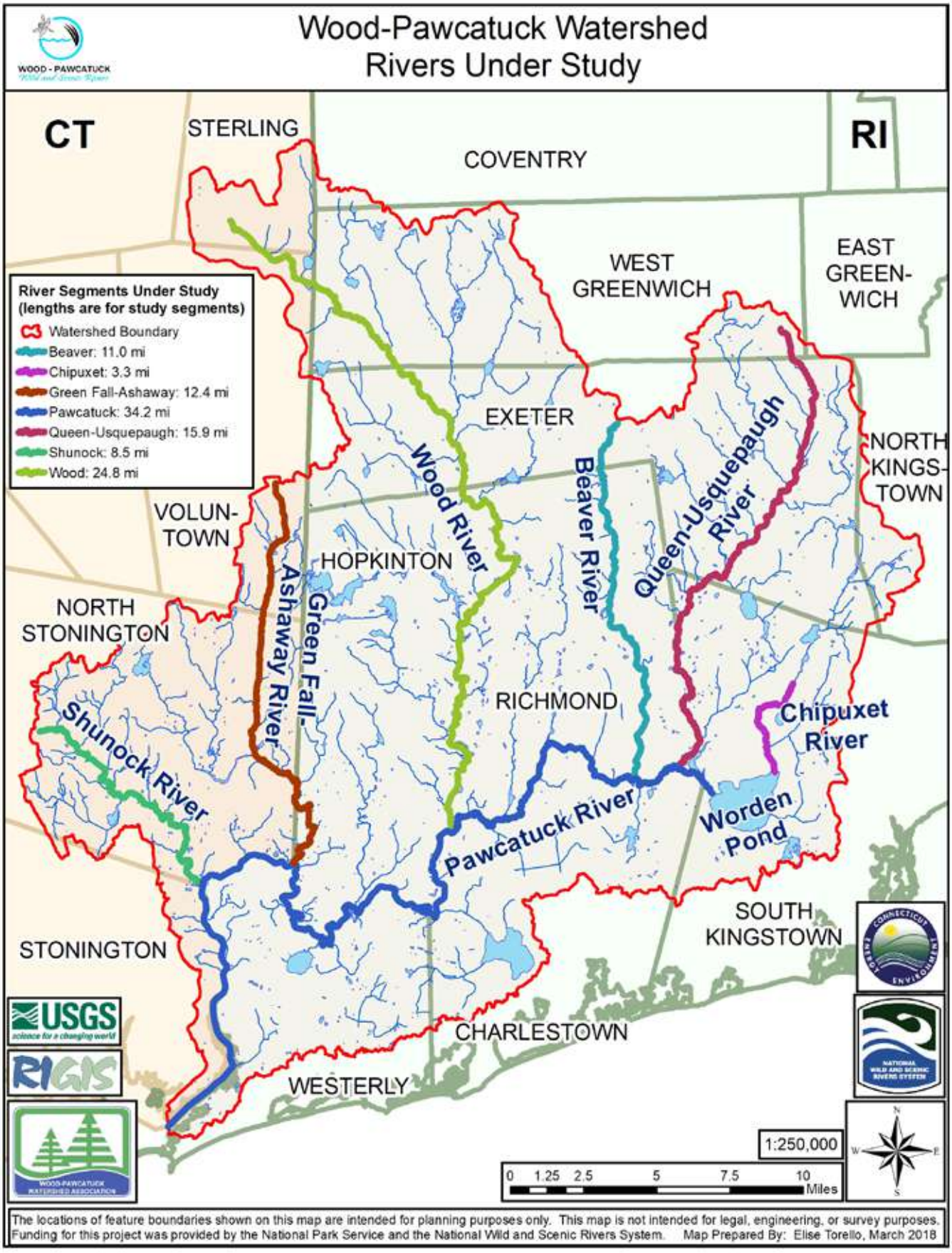

Figure 1. Seven rivers within the Wood-Pawcatuck Watershed under consideration for Wild and Scenic designation.

Message from the Wood-Pawcatuck Wild and Scenic Rivers Study Committee

Greetings:

The Wood-Pawcatuck Wild and Scenic Rivers Study Committee is pleased to present the Wild and Scenic Stewardship plan for the Wood-Pawcatuck Watershed and its rivers - the Beaver, Chipuxet, Green Fall-Ashaway, Queen-Usquepaugh, Pawcatuck, Shunock, and Wood. Over the past three years local residents appointed by the watershed towns, with support from the National Park Service, the Wood-Pawcatuck Watershed Association, state agencies from Connecticut and Rhode Island, and several non-government agencies, have participated in the Wood-Pawcatuck Wild and Scenic Rivers Study Committee. The Committee has carefully studied the rivers, considering their natural, cultural and recreational resource values, and evaluated current strategies for protecting and enhancing these special places. Based on this analysis and by looking at plans for other Wild and Scenic Rivers in neighboring New England states, the Committee has developed a plan for the eight towns in Rhode Island and four towns in Connecticut that provides local protection strategies for their consideration and implementation. We hope it provides a blueprint that is not only consistent with local and state ordinances but looks forward to meet future needs as well.

As we consider the Stewardship Plan that is being presented, let's take a moment to reflect on the Wood-Pawcatuck Watershed. We may remember walking a wooded trail along the river bank with our grandparents, or paddling the river with our families, or enjoying the quiet solitude as we fish from the shoreline. The 300-square-mile Wood-Pawcatuck Watershed is renowned throughout the region for its history and beauty, as well as for providing recreational fishing and paddling opportunities unsurpassed in Southern New England. Much of the land in the watershed is protected either by Rhode Island Department of Environmental Management or Connecticut Department of Energy and Environmental Protection,

non-government agencies, or local Land Trusts. Historic mills and other landmarks highlight the Native American culture and local history. The watershed contains the Pachaug-Great Meadow Swamp, a National Natural Landmark, and its pristine tributaries are the habitat of diverse fish populations. Contiguous forest patches and unique wetlands in the watershed provide critical habitat for many of the endangered species in Rhode Island and southern Connecticut. All of these 'Outstandingly Remarkable Values' are being considered for recognition by the National Park Service's Wild and Scenic Rivers program. The goal of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan is to ensure that watershed residents will continue to enjoy these special places and to ensure that these rivers continue to provide outdoor joy and adventure to all citizens of southern New England for generations to come.

Wood-Pawcatuck Wild and Scenic Rivers Study Committee (Photo credit: Ayla Fox)

Acknowledgments

The Wood-Pawcatuck Wild and Scenic Rivers Study Committee

The Study Committee's membership includes locally appointed representatives from each town in the Study Area, and representatives from the Connecticut Department of Energy and Environmental Protection (CT DEEP), the Rhode Island Department of Environmental Management (RI DEM), the National Park Service (NPS), the Wood-Pawcatuck Watershed Association (WPWA), Save The Bay (STB), Audubon Society of Rhode Island (ASRI), and The Nature Conservancy (TNC). The town appointees are all volunteers, who met more than thirty times over the three years of the study period. They also put in countless hours between meetings researching and reviewing materials for this plan and conducting outreach to their towns. Thanks to their dedication and perseverance the study process has truly been a grass-roots effort.

The Study Committee would like to thank Senators Jack Reed and Sheldon Whitehouse, and Representatives Jim Langevin and David Cicilline from Rhode Island; and Senators Richard Blumenthal and Chris Murphy, and Representative Joe Courtney from Connecticut, for nominating and supporting the Wood-Pawcatuck Watershed for National Wild and Scenic designation. Additionally we would like to recognize the town councils and boards of selectmen, and other town boards and commissions, for their support in endorsing the Stewardship Plan. Thanks to Ayla Fox and Chip Young for bringing the watershed to life through multimedia; Louis Sposato for his guidance in chairing the Study Committee at its outset; all of the experts who shared their time and expertise with the Committee over the course of the study; and to WPWA for hosting most of the Study Committee's activities. Finally, we would like to recognize Denise Poyer for her tremendous efforts in coordinating the Study Committee's activities and shepherding the Stewardship Plan from concept through to completion; it would not have been possible without her hard work and dedication. Thank you.

Wood-Pawcatuck Wild and Scenic Rivers Study Committee (Photo credit: Ayla Fox)

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Avalonia Land Conservancy
Eightmile River Watershed
Narragansett Chapter of Trout Unlimited
Rhode Island Blueways Alliance
Rhode Island Canoe and Kayak Association
Rhode Island Natural History Survey

Great blue heron on the Pawcatuck River in Westerly, RI (Photo credit: Dan Hyland)

CHAPTER 1: EXECUTIVE SUMMARY

Determination: The Study Committee established that all seven rivers meet eligibility under the Wild and Scenic Rivers Act (WSRA), and identified several outstandingly remarkable values for each river and the watershed as a whole. The committee developed a stewardship plan that demonstrates ongoing policies and activities that protect the rivers' values. The Study Committee decided to focus on a watershed approach to protection, since it would better protect the values of all seven rivers. The plan also suggests ways to improve protection to assure the rivers' values will exist for future generations.

Next Steps: After resolutions of support are obtained from all twelve towns in the watershed Congress will be asked to approve a bill to amend the National Wild and Scenic Rivers Act to include the the Beaver, Chipuxet, Green Fall-Ashaway, Queen-Usquepaugh, Pawcatuck, Shunock, and Wood Rivers.

Effects of the Stewardship Plan

Designation as a Wild and Scenic River will result in establishment of a Stewardship Council comprised of representatives appointed by the twelve participating municipalities, CT DEEP, RI DEM, WPWA, STB, TNC, ASRI, and the NPS. The Stewardship Council will guide the administration of the designation and imple-

mentation of the locally-developed Stewardship Plan. Designation will result in an appropriation of federal funds, subject to Congressional approval, to support implementation of the Stewardship Plan.

Existing state and local laws will continue to govern; private lands and activities will not be subject to increased federal control. Land use decisions will continue to be made by local planning and zoning boards, not federal agencies. **The federal government will not acquire lands as a result of the designation.** Existing dams can remain or be retrofitted for fish and aquatic life passage structures. Hunting and fishing laws and regulations will be unaffected, and rules governing agricultural practices will not change. If the rivers are designated as Wild and Scenic, the designation will give the local municipalities a voice, through the Stewardship Council and the National Park Service, in protecting the rivers' Outstandingly Remarkable Values (ORVs) from any harmful effects of new federally funded or permitted construction or development of projects affecting the designated portions of the rivers.

Stewardship Recommendations

This Stewardship Plan presents a series of recommendations that can be **voluntarily implemented** by local landowners, municipalities, and state and federal agencies working together to help protect river-related resources and maintain and enhance the quality and way of life valued by so many people. The voluntary recommendations in this Stewardship Plan can be implemented by the locally-appointed Stewardship Council, working with communities and partners on a voluntary basis, after the seven rivers are designated by Congress as Wild and Scenic Rivers.

Why a watershed approach?

Alan Desbonnet

Tens of thousands of years ago, retreating glacial ice left behind great sand-filled depressions in the landscape of southern New England. The sands filled with water and became rivers, the source of life for the rich diversity of the Wood-Pawcatuck Watershed. Today, waters above and below the ground are an intimately linked system essential to sustaining all life in the watershed.

Four towns in Connecticut and eight in Rhode Island have jurisdiction over the lands and waters comprising the Wood-Pawcatuck Watershed. However, natural systems like watersheds do not follow human boundaries nor do they conform to the tangle of local, state and federal regulations. When governmental entities do not closely coordinate land use planning and regulations across manmade boundaries the potential for conflict is high. Therefore the best way to avoid conflicting and potentially damaging cross-jurisdictional use and planning is to ignore the human boundaries and take a holistic watershed-wide approach to the stewardship of rivers, ponds and underground reservoirs.

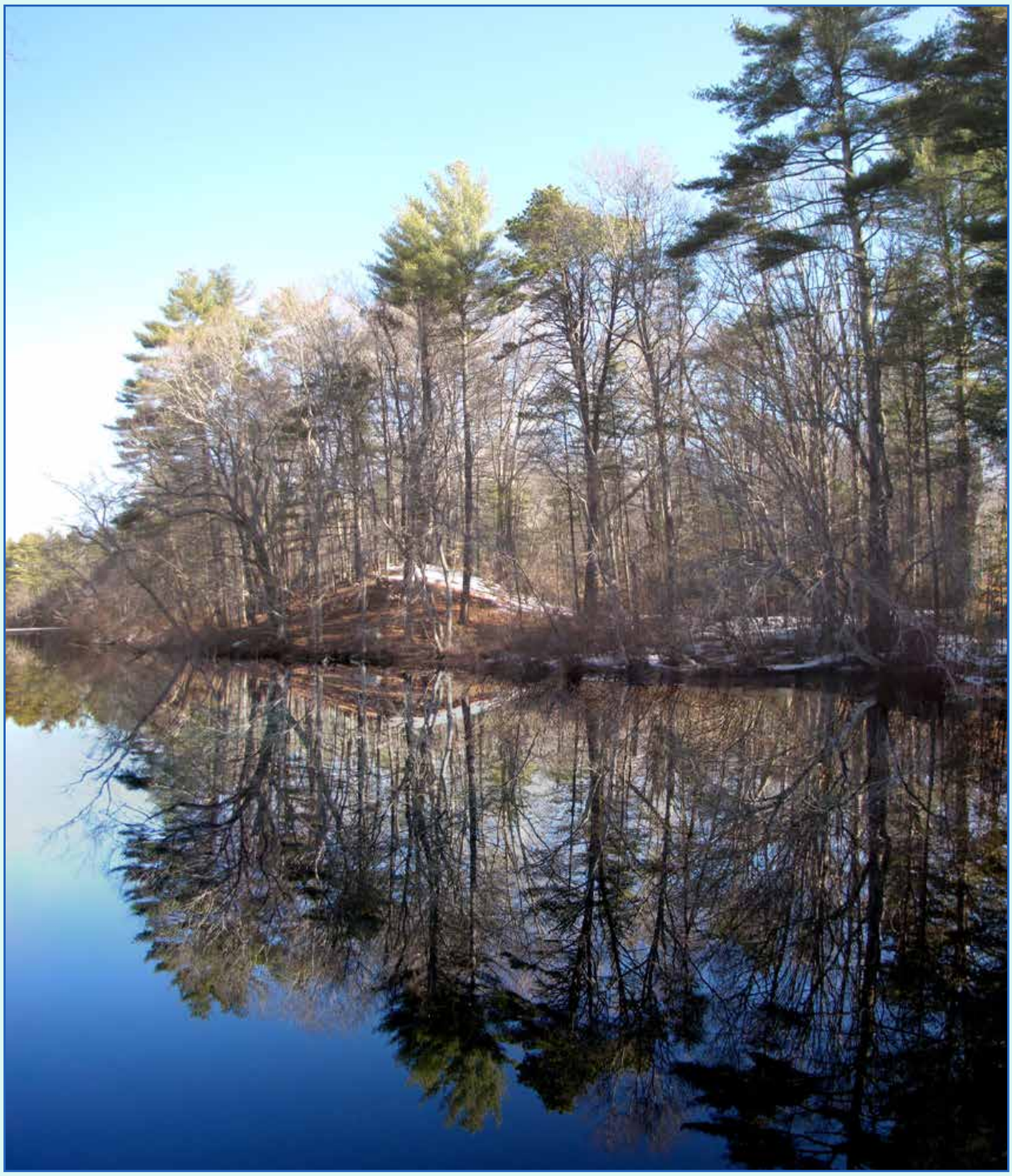
Everyone needs water to survive. In the Wood-Pawcatuck Watershed nearly one hundred percent of the population relies on the watershed's underground reservoirs, called aquifers, to supply them with clean drinking water. That is why the Environmental Protection Agency designated the Wood-Pawcatuck Watershed as a "Sole Source Aquifer" in 1988. This Sole Source designation exists to add federal protection to regions where more than fifty percent of people cannot obtain drinking water from anywhere other than wells fed by groundwater. Often unknowingly, private homes, municipal water suppliers, and industry compete with each other for these limited underground drinking water sources. The only sensible way to manage an invaluable resource like drinking water is to employ a watershed-wide approach.

The importance of such an approach is also crucial to preserving the quality of life we all enjoy thanks to the mostly rural character of the watershed. The land and water bodies found in the Wood-Pawcatuck Watershed are highly acclaimed for their outstanding recreational value. Outdoor enthusiasts of all kinds such as canoeists, kayakers, hikers, hunters, birders, and fishermen throughout New England rely on this watershed as a doorway to quiet, relaxing and refreshing time in a largely undeveloped landscape. The Wood River—its headwaters and tributaries in particular—is considered some of the best trout fishing water in the region. Just knowing that abundant wildlife exists within two of the most densely populated states in the nation is balm to many of the residents.

Access to clean water should be afforded to everyone, not just those who live next to it. We are living in a time of rapidly changing climatic conditions. Some regions of New England are expected to become drier, some wetter. We don't yet know exactly how that will change the watershed and affect the rivers and aquifers. We expect more rain in winter and less snow, and more extreme rainfall events and resulting periods of flooding. Will the new "normal" - for how much precipitation falls, in what form, and when - provide continuity of the rivers' Outstandingly Remarkable Values? How will this affect those values for future generations?

Designation as Wild and Scenic provides a unique opportunity for the people and the authorities that use and manage watershed resources to convene and plan for the future. A water-

shed-wide approach that unifies ecological needs and multi-jurisdictional human needs is what must be used if watershed resources and uses are to survive and thrive into the future. The challenges are great, especially in the face of a rapidly changing climate. But the benefits which will come to the unique jewel of a resource, the Wood-Pawcatuck Watershed, from planning in a watershed-wide fashion today, will be incalculable for generations to come.



Reflections on the Wood River (Photo credit: Elise Torello)

Shunock Brook Preserve, North Stonington, CT (Photo credit: Peter Marteka)

CHAPTER 2: INTRODUCTION AND BACKGROUND

Background and History: The story of National Wild and Scenic Rivers designation for the Wood-Pawcatuck Watershed actually began in 1980 when the National Park Service (NPS) conducted a survey of potential rivers along the east coast to include in the national program. While the criteria at the time were not favorable for the small rivers of New England (this was before the partnership rivers model), the survey report did identify sections of the Wood and Pawcatuck Rivers as having several Outstandingly Remarkable Values (ORVs). In particular it was noted that the Wood River had the highest biodiversity of any river in New England. Due in large part to this report, the Wood-Pawcatuck Watershed Association (WPWA) was formed in 1983 to protect the rivers of the watershed.

In 2010 WPWA formed a coalition of stakeholders in the watershed to again pursue Wild and Scenic River designation to recognize and protect five rivers of the Wood-Pawcatuck Watershed. The group developed local, regional and state partnerships, gathered letters of support and gained votes of approval from all of the towns that would be involved in a Wild and Scenic River Study. Specifically, local interest was expressed in pursuing a "Partnership Wild and Scenic River Study," based on river management models such as the Lamprey River in New Hampshire and the Farmington River in Connecticut.

A reconnaissance survey of the Wood-Pawcatuck Watershed was conducted by the Northeast Region of the NPS at the request of Representative Jim Langevin (RI-2) in 2013. The reconnaissance survey provided a preliminary assessment of the eligibility and suitability of the Wood-Pawcatuck River as a candidate for a Wild and Scenic designation according to criteria established under the Wild and Scenic Rivers Act. Preliminary findings stated "the NPS reconnaissance survey team has determined that segments of the Wood-Pawcatuck Rivers exhibit free-flowing character and noteworthy natural, cultural and recreational resource values likely to meet eligibility criteria for inclusion in the National Wild and Scenic Rivers System. In addition, the presence of very strong community and interest group support for a Wild and Scenic River Study, together with a demonstrated track record of natural and cultural resource protection, support key elements of suitability for inclusion in the System, and provide a strong indication that a Wild and Scenic River Study would be appropriate and productive."

As a result of the support of the watershed towns, Congressmen Jim Langevin and Joe Courtney introduced the Wood-Pawcatuck Watershed Protection Bill (Study Bill) in the House of Representatives during the 112th Congress. A companion bill was introduced into the Senate by Senators Jack Reed and Sheldon Whitehouse. The Study Bill passed the House but failed to make its way through the complete legislative process. The Study Bill was re-filed in February 2013, where it again easily passed the House and received Senate approval in late 2014. The Study Bill amends the Wild and Scenic Rivers Act to designate segments of the Beaver, Chipuxet, Queen-Usquepaugh, Wood, and Pawcatuck Rivers for study for potential inclusion in the National Wild and Scenic Rivers System. In 2016 the Study Committee elected to add two more rivers in the state of Connecticut – the Shunock and Green Fall-Ashaway Rivers.

Current Study: NPS developed a cooperate agreement with WPWA to coordinate the study in 2015. WPWA solicited representatives from each of the fourteen towns in the watershed to serve on the Wood-Pawcatuck Wild and Scenic Rivers Study Committee. Twelve towns appointed representatives to the Study Committee: Charlestown, Exeter, Hopkinton, North Kingstown, Richmond, South Kingstown, Westerly and West Greenwich in Rhode Island; North Stonington, Sterling, Stonington and Voluntown in Connecticut. Also included were the two state environmental agencies, RI DEM and CT DEEP; and three key environmental nonprofit organizations, STB, TNC, and ASRI. NPS provided staff support and overall coordination. Two towns, Coventry and East Greenwich in Rhode Island, have less than one percent their town in the watershed and neither contains any portion of the rivers under study. Both towns elected not to send a representative to the Study Committee.

Figure 2. Major watersheds adjacent to the Wood-Pawcatuck Watershed

The Watershed

The Wood-Pawcatuck Watershed encompasses approximately 300 square miles in southeastern Connecticut and southwestern Rhode Island. The watershed contains seven major drainage areas including the Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers. It is one of the few remaining relatively pristine natural areas in southern New England between New York and Boston.

With its outstanding New England sports fishery, fifty-two miles of flat water paddling, and hundreds of acres for wildlife viewing and birdwatching, the region is a key destination for recreation. The headwaters of the Pawcatuck River are located in the town of South Kingstown, Rhode Island and its terminus is in the town of Westerly, Rhode Island and Stonington, Connecticut, where it drains to the Little Narragansett Bay at the northeastern corner of Long Island Sound. The coastal town of Westerly is a popular tourism destination with its scenic views of the Rhode Island Sound and has long been a destination for those seeking a beach community vacation.

The Wood-Pawcatuck Watershed is unique in the region due to the high level of habitat and species diversity, as well as the number of rare and endangered species (including some globally-rare species). This high biodiversity is due in large part to past efforts to protect lands within the Wood-Pawcatuck Watershed. About twenty-three percent of the watershed is protected within lands owned and managed by RI DEM and CT DEEP, while non-government agencies (e.g. TNC, ASRI, and local land trusts) protect another ten percent of the watershed. TNC, a local partner of the WPWA, has dubbed the Wood River a "Unique and Special Place," and the associated "Borderlands" along the Connecticut/Rhode Island border valuable due to the thousands of acres of contiguous woodlands. In addition, the North Atlantic and lower New England ecoregions intersect within the watershed, providing for plant and animal communities that reflect a mixture of coastal and inland, and northern and southern, influences.

This Stewardship Plan was developed as part of the Wood-Pawcatuck Wild and Scenic Rivers Study process. The goal of this plan is to establish recommended tools and strategies for future collaborative management of the Wild and Scenic Rivers to ensure that the watershed will be protected for generations to come. The Plan was developed by the Study Committee, with leadership from the WPWA, and with input from local towns and citizens within the Watershed, state managers, invested nonprofits and other stakeholders. Community and state endorsement for the plan substantiate local and state commitment to watershed conservation.

Purpose of the Stewardship Plan

The Wood-Pawcatuck Watershed Stewardship Plan, developed in partnership with the Study Committee, local town planners and conservation commissions, residents, the states of Connecticut and Rhode Island, and major non-government agencies, provides a blueprint for the long-term protection of the watershed's special natural, cultural and recreational resources. **The activities described in the Stewardship Plan will be led and implemented locally with input and guidance from the Stewardship Council (see below). The Stewardship Plan is a non-regulatory document.** The plan describes a management approach that is consistent with the original intent of the study effort, which was to insure that watershed management and protection efforts are maintained by the twelve municipalities and two state governments.

The Stewardship Plan accomplishes the following:

1. Provides stakeholders a clear recommendation of how to protect and enhance the watershed's ORVs and the role a Wild and Scenic designation would have in implementing such recommendations.
2. Substantiates to Congress the suitability of the watershed for designation by showing the willingness of the local communities, the state and other stakeholders to be partners in the plan's implementation.
3. Provides measurable indicators and guidance to future decision-makers about what constitutes sufficient protection if goals for the ORVs are to be met.
4. Establishes management recommendations that rely principally on locally-led and locally implemented strategies.
5. Serves as the Comprehensive Management Plan required for all Wild and Scenic rivers.
6. Establishes eligibility for federal technical and financial assistance when the watershed becomes part of the National Wild and Scenic River System.

Regardless of achieving a designation, the Stewardship Plan will serve as a guiding document for ongoing management of the region. It will need occasional updates and adaptation as resource protection needs evolve and priorities shift.

Beaver River, Richmond, RI (Photo credit: Denise Poyer)

CHAPTER 3: WOOD-PAWCATUCK WILD AND SCENIC RIVERS

The main task of the Study Committee over the past three years was to determine and define what overall values of the rivers and the watershed are the most important to the region and the nation. The Committee identified the following categories of values as the most significant and worthy of national recognition: **Geology/Hydrology, Exceptional Ecosystem, Cultural, and Recreational**

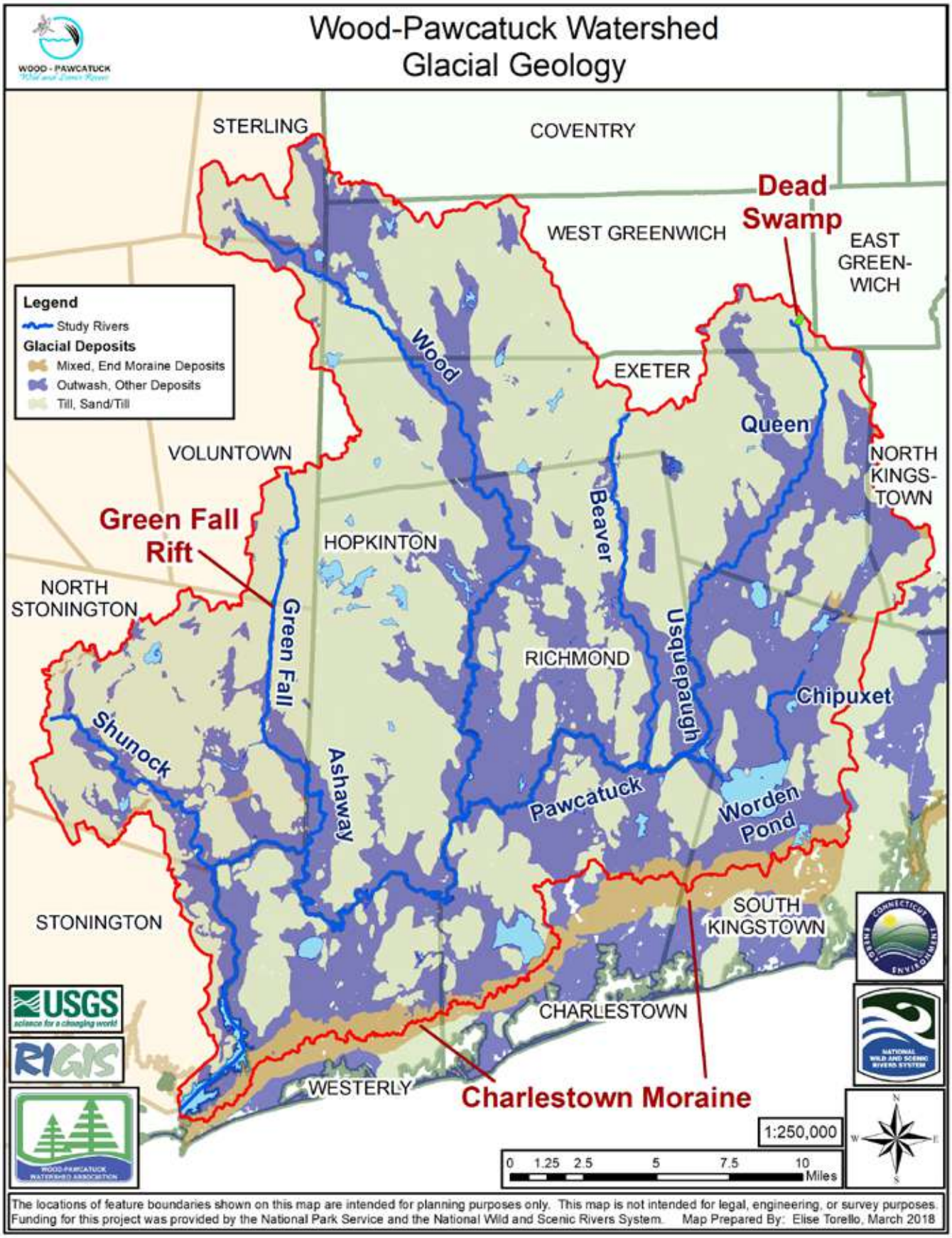


Figure 3. Wood-Pawcatuck Watershed glacial geology

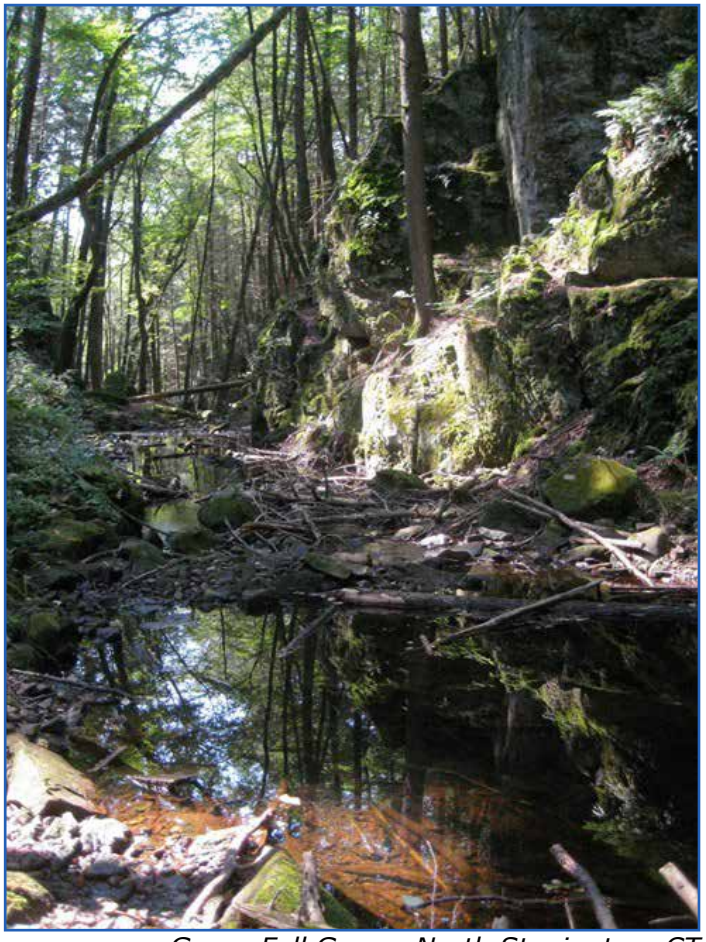
Geology/Hydrology

The key geological feature of the Wood-Pawcatuck Watershed is the formation of the basin. About 20,000 years ago, retreating glaciers left a recessional moraine, now known as the Charlestown Moraine. Running approximately east to west along US Rt. 1 in Rhode Island, this 150-foot high land mass effectively blocked the southerly flow of historic rivers. Instead the rivers collected into the *Pawcatuck River* which flowed to the west and even north at times before forming an outlet into Little Narragansett Bay between present-day Westerly, RI and Stonington, CT. In addition, the moraine created extensive wetlands to the north, including the Great Swamp, Cedar Swamp, and Chapman Swamp.

The Environmental Protection Agency (EPA) has recognized the Wood-Pawcatuck Watershed as a sole source aquifer. All of the drinking water for residents of the watershed is supplied by private or public wells that tap into one of the seven significant subsurface aquifers, which were also created by the glacial retreat. These are found primarily along the river corridors. The Kingston Water District has wells just east of Worden Pond and supplies water for The University of Rhode Island and parts of South Kingstown. Most all of the watershed contains high quality water.

Some Key Findings on the Exemplary Status of the Geology and Hydrology in the Wood-Pawcatuck Watershed

- Green Fall Rift Valley (in the Green Fall region) is one of the more notable geologic features in the watershed. More of a shear than a rift, it is evidence of weakened bedrock snapping apart and falling in a linear fault pattern called a lineament. During the assemblage and subsequent breakup of the Pangea supercontinent between 175 and 200 million years ago, the southern Rhode Island and Connecticut borderlands region was geologically traumatized. Western North Stonington pres-



Green Fall Gorge, North Stonington, CT (Photo credit: Auntie Beak)

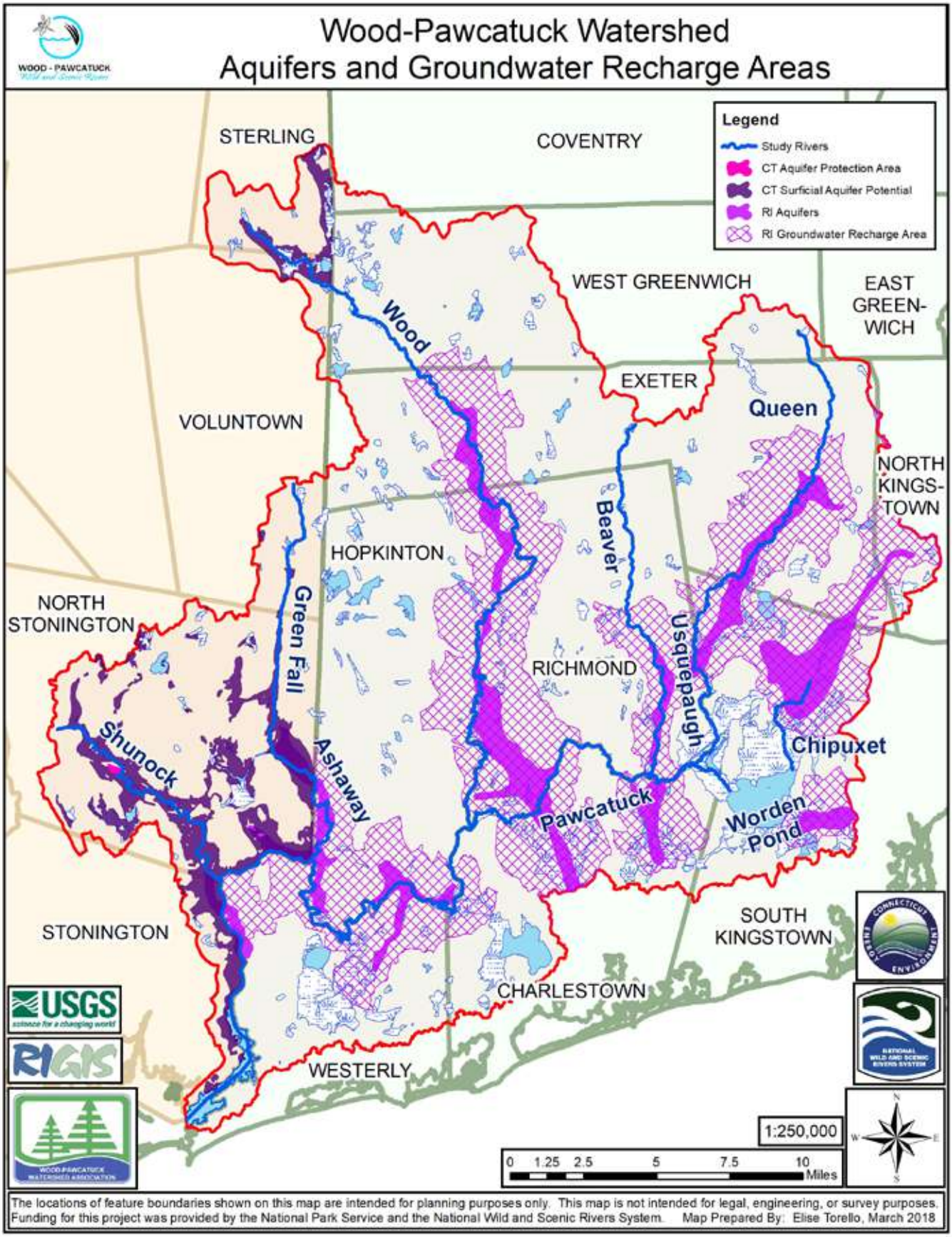


Figure 4. Wood-Pawcatuck Watershed aquifers and groundwater recharge areas

ently hosts the tectonic plate margin left behind from that era. The landscape is profoundly contorted in areas where it is not buried under glacial sediments.

- The deposition of the Charlestown Moraine by the retreating glaciers 20,000 years ago created the current path of the *Pawcatuck River* and Worden Pond, the largest natural freshwater lake in Rhode Island. It also caused vast acres of swamps to develop along the rivers path. These include the Great Swamp, the largest wetland in the region, Cedar Swamp, Phantom Bog, and Chapman Swamp. Due to the extensive wetlands many areas were never developed.

- An unusual topographic feature is the headwaters of the *Queen-Usquepaugh River*, Dead Swamp in West Greenwich. This is the only place in the region where a wetland flows into two separate watersheds – the Wood-Pawcatuck Watershed and the Pawtuxet River Watershed. Near the village of Usquepaugh the *Queen-Usquepaugh River* is part of a large outwash plain, which contains significant agricultural fields. The river is used for irrigation of these fields.

- The lower *Wood River* has an extensive aquifer that supplies town wells for some Hopkinton and Richmond residents. In addition the RI Water Resources Board has identified several properties along river that have the potential to be future public wells. Several of these properties have been purchased and are now in permanent protection.

- The *Chipuxet River* is also part of the aquifer that supplies water for the Kingstown Water District and the town of South Kingstown. The rich aquifer and abundant surface water of the *Chipuxet River* provide irrigation for agricultural fields, both above and at the beginning of the designated area. These agricultural fields are on outwash plains, the result of glacial melt water, and contain high quality soils for farming.

Beaver lodge in the Great Swamp, South Kingstown, RI (Photo credit: Elise Torello)

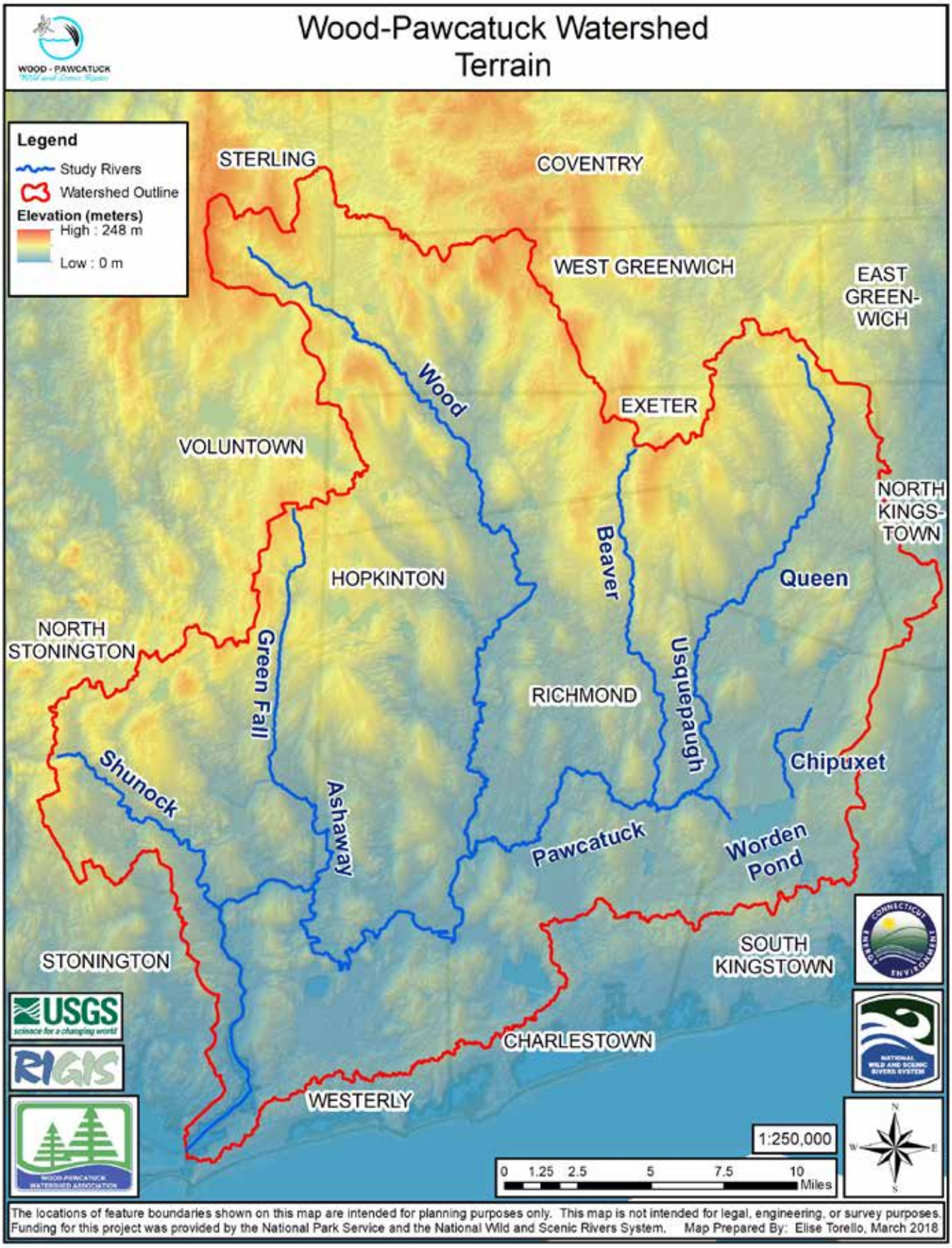


Figure 5. Wood-Pawcatuck Watershed hillshade elevation map

Southern New England Deep Freeze

Charles Hickox

Imagine standing knee-deep in ice water. The time is mid-summer, 17,000 years ago. The place is your favorite beach along the Rhode Island shore. Look north; immediately before you lies the steep front of an ice sheet that extends northward to Canada and beyond. This ice sheet is almost a mile high. You are soaked to the knees because the ice is melting rapidly in the summer heat. The melt water is pouring down the front of the glacier in a braid of streams. Look south; the sea is nowhere in sight. A soggy, sandy plain slopes gently southward from the foot of the glacier. In the middle distance is a freshwater lake, eight miles wide and sixty miles long. The lake is between what are today the southern beaches of Rhode Island and Block Island. Beyond the lake a colossal hill of dirt and rocks towers over the southern horizon. Parts of this hill will become Long Island in New York, Block Island, Martha's Vineyard, and Cape Cod. Out of sight beyond the hill a second sandy plain blankets what is to become the continental shelf. It too slopes gently toward the south, to the sea many miles away. Upon the plains grow tundra-type plants, which feed the musk-ox, wooly mammoth, and great herds of caribou. Waiting to snatch up stray animals are wolves, giant bears, and saber-toothed tigers. All of these animals are soon to be extinct or will be forced to make their homes farther north.

During the past 2.5 million years glaciers have covered most of the northern hemisphere at least four times. Each of these glacial stages lasted about 70,000 years. They were separated from each other by longer periods of time, called interglacial stages, when the earth warmed up. During the interglacial, the ice melted from both Eurasia (Europe and Asia) and North America. Glaciers on the mountains drew back and almost disappeared. No one knows what causes the climate to turn so cold that it produces glaciers.

The most recent glacial period, called the Wisconsin Stage, began about 75,000 years ago. Huge snow storms covered the area. So much snow fell that it became packed down under its own weight and turned into ice. Like earlier ice sheets, this one developed over the Laurentian mountains east of Hudson Bay, in Canada. It took a long time, but finally it became so thick that it started to flow outward in all directions. The ice covering North America reached its maximum extent about 21,000 years ago. The front edge of the ice reached as far south as northern New Jersey, and ice covered a third of the world's land surface. Ice domes that covered Canada, Scandinavia, and Siberia were as much as 2.5 miles thick. These domes were like the ones that still cover Greenland and the Antarctic today. The tremendous amount of water, locked up in glaciers, came from evaporation of seawater. Because so much water was frozen, sea level worldwide was lowered 350 feet. The New England shoreline lay along the outer limit of the continental shelf, as much as 150 miles off the present coast.

Glaciers are messy and dirty. That's because as the ice moves forward it picks up soil, sand, gravel, and boulders, collectively called sediments. The glacier rolls the sediments up into the ice, just like rolling a snowball over dirt. An advancing glacier is also a bulldozer, pushing ahead of it the loose material that lies in its path. Even when the edge of the glacier begins to melt, the ice is still pushing ahead from its source far to the north, continually bringing more sediment to the edge. When the push finally stops and the ice starts to melt back, a gigantic hill, or ridge, of these sediments is left behind. These ridges are called terminal moraines or end moraines. Long Island, Rhode Island and southern Massachusetts

have some of the finest examples of moraines in the world. The terminal moraine south of New England originally extended unbroken from Brooklyn, New York, eastward along the axis of Long Island, Martha's Vineyard, and Nantucket. When the climate started to warm up again the ice front melted back, but not all at once. About 17,000 years ago the climate cooled again for a short time. It actually became cold enough so that the glaciers started to grow again. This time, the glacier moved forward only about twenty miles. But it did have a chance to bulldoze up another moraine. This recessional moraine also begins at Brooklyn, but it stretches eastward along the north shore of Long Island to Orient Point, through Plum and Fisher's Islands, Napatree Point, and Watch Hill, then along the Rhode Island coast near Routes 1 and 1A. At Point Judith it swings seaward to form the Elizabeth Islands and the north shore of Cape Cod. In Rhode Island, this ridge is known as the Charlestown Moraine. If you drive south on Ministerial Road (Rt. 110) to Rt. 1, you will drive up and over the recessional moraine. The Great Swamp and Worden Pond in South Kingstown and Watchaug Pond in Charlestown were created because the water flowing south could not get through the Charlestown Moraine.

16,000 years ago the climate had warmed once again and the glacier started to move back again. By 12,500 years ago the front had receded back into Canada from whence it came and New England has been ice-free ever since. Each of the above dates has been established by one of several radiometric methods.

The glacier left behind special land formations called kames and kettles. Kames are rounded, twisting ridges that form steep rocky hills. Kames are formed when the huge cracks, or crevasses, in the ice become filled with glacial debris. When the ice melts, these crevasse-fillings are left standing as ridges. Kettles form where great blocks of ice broke off from the main glacier, but did not melt right away. These great blocks finally melted, leaving a depression in the ground. The depressions were in effect a cast of the ice blocks. The holes filled with ground water to form the kettle ponds commonly seen in New England. They are roughly circular, but the size and depth depend on the size of the melting block. No Bottom Pond and Dr. Lewis Pond are kettles, as are most of those closed depressions and little ponds of Fisher's Island and Watch Hill. Block Island is said to have a pond (kettle) for every day of the year. The water tower off Winnapaug Road sits on a kame; so does the Ocean House. Chin Hill and the Dumplings at the west end of Fisher's Island Sound are kames. Like a great Swiss cheese, the land along Routes 1 and 1A is typical kame-and-kettle topography.

In addition to the moraines, the glacier left behind two main types of glacial deposit from which our modern soils have evolved in Rhode Island. If you live north of the Charlestown moraine, your house probably rests on till. Till covers about eighty percent of any area that once had a glacier on it. It is the stuff left behind after the ice has melted, an unsorted hodgepodge of all sizes of rocks, from fine clay to boulders as big as a house. New England till is very coarse and full of boulders because the bedrock is made of very hard granite. Midwestern till, on the other hand, tends to be fine-grained because there the bedrock is made of soft shale and limestone. Anywhere you see a stone fence in the woods around New England, you know that you are on till. All the till in the area made it hard to farm. That is why so many farms in Exeter and West Greenwich were abandoned when the mills started up near the rivers. Mill villages grew up around dams and factories. The farms turned back into woods.

The second type of soil produced by the glaciers is called outwash. It is deposited in front of a melting glacier. When the water flows down the steep front of the glacier and reaches the flat plain at its foot it loses speed. The melt water puts down the sediment, sand and gravel, like a great sandy apron. Outwash is layered and well sorted because it has been moved around by running water. Although most of the outwash along the southern New England coast now lies on the continental shelf, remnants extend seaward from the foot of the moraines. The plains along the south shore of Cape Cod, Nantucket, Martha's Vineyard, and Long Island are examples. In Westerly, the gently sloping surface at the foot of the Charlestown Moraine, between Winnapaug and Maschaug Ponds, is outwash. Winnapaug Day Camp lies on outwash, as do most of Pond View Golf Course and holes 10 through 13 of the Winnapaug course. East from Westerly, Quonochontaug Beach, Ninigret Wildlife Preserve, Charlestown Beach, and Matunuck are all located on outwash. Outwash is not only deposited as a broad apron at the foot of an end moraine, but is also deposited in valley bottoms where streams are fed by torrents of glacial meltwater. Advancing ice overrides its own outwash, but a melting glacier will leave behind a valley partly filled with beds of sand and gravel. The outwash plains at White Rock and Shunock Brook are examples. The Little League field at Anquilla Brook, Pawcatuck, is on outwash; so are the turf farms along Rt. 2 and Chariho High School, the playing fields at the University of Rhode Island, and former Ladd Center in Exeter, as well as the Veterans Cemetery, River Bend, and Elm Grove cemeteries. In fact, most Yankee cemeteries are located on outwash, where digging was easy. Many small and large outwash plains became gravel pits. The Center of New England, a large retail and residential complex off Rt. 95 in Coventry, was built on the site of a gravel pit where most of the sediments from the outwash plain have been removed.

When at last the world's climate began to warm and the great ice sheets melted, the sea came back upon our shore like a great tide flooding a beach. During deglaciation, sea level rose so quickly that no lasting shoreline features had time to develop. Today, the Connecticut shore has deep estuaries and snug harbors but few beaches. Long Island and Rhode Island, bordered by the Charlestown moraine and gently shelving sandy outwash, are known for their barrier beaches and salt ponds.

Whatever the cause, we are in an interglacial stage today. The cycles of ice ages and interglacial periods of the past were presumably no different from those that will follow in our future.

Mountain laurels on the Charlestown Moraine, South Kingstown, RI (Photo credit: Elise Torello)

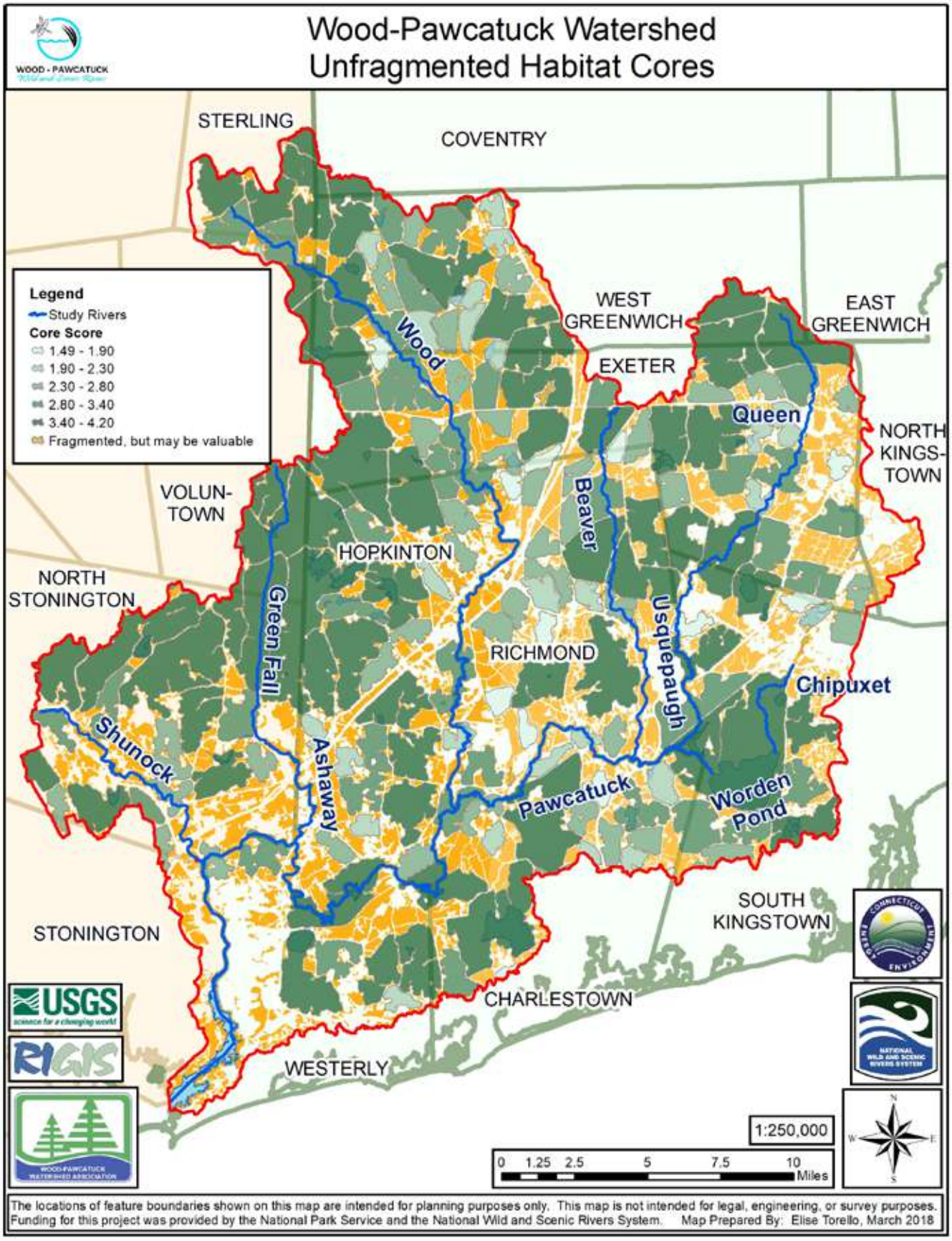


Figure 6. Wood-Pawcatuck Watershed unfragmented habitat cores

Exceptional Ecosystems

This unique convergence of geology and hydrology have created exceptional ecosystems throughout the watershed, supporting over fifty percent of the region's rare, endangered, or species of concern. The Wood-Pawcatuck Watershed is one of the least developed watershed ecosystems in the New York to Boston corridor. It was found by the EPA Resource Protection Study to contain the highest incidence of large, contiguous, forested areas in southeastern New England. Both the Rhode Island and Connecticut State Wildlife Action Plans describe unfragmented cores of over 500 acres as being of special importance to protecting wildlife. The watershed contains more than half of Rhode Island's largest cores, including 31 of 60 statewide over 1000 acres; 6 out of 9 statewide over 2000 acres, and 3 of 4 statewide over 2500 acres. The data in Figure 6 represent another tool to assess intact habitat cores, using scores developed by Environmental Systems Research Institute (Esri) staff. Habitat cores are minimally disturbed natural areas at least 100 acres in size and greater than 200 meters wide. These data are intended to identify natural assets and support green infrastructure planning at the national, regional, and local scales.

Due to the lack of development and large forested tracts, the watershed remains one of the darkest areas in the region. The watershed also contains considerable aquatic habitat suitable to the maintenance of diadromous fish and other native fishes. It has been the site of several ongoing fish passage restoration programs. Most of the rivers and streams in the watershed are coldwater fisheries, supporting native brook trout and freshwater mussel species.

<u>Some Key Findings on the Exemplary Status of Exceptional Ecosystems in the Wood-Pawcatuck Watershed</u>

- The <u>*Beaver River*</u> is ninety-one percent undeveloped and heavily forested. Nearly half the river runs through protected properties held by RI DEM, The Nature Conservancy and local land trusts. Due to these large areas of unbroken forested blocks, the <u>*Beaver River*</u> provides clean, cold water habitat

Painted turtles on a log in the Wood River (Photo credit: Thomas Tetzner)

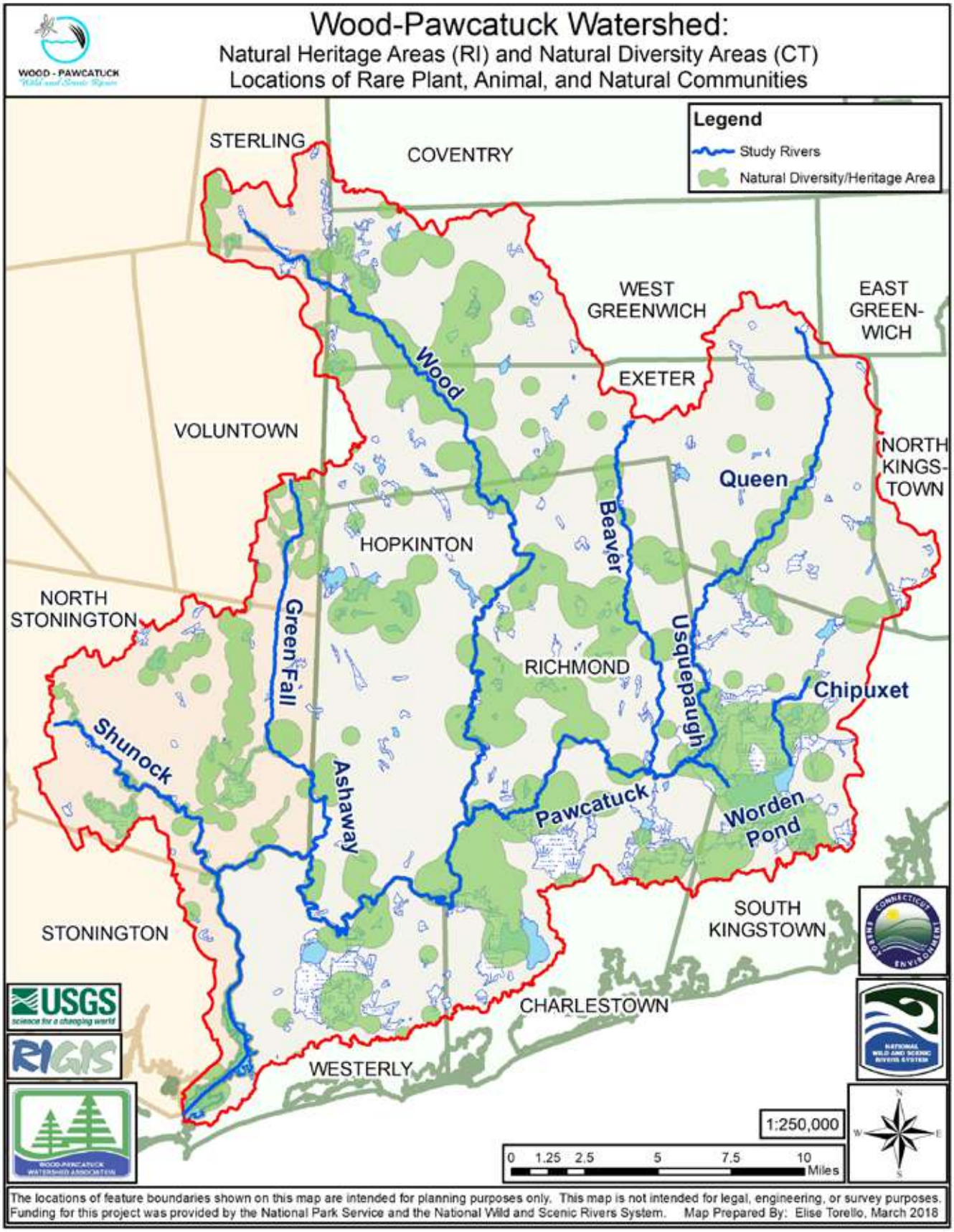


Figure 7. Wood-Pawcatuck Rhode Island Natural Heritage Areas, Connecticut Natural Diversity Areas, and locations of rare plant, animal, and natural communities

that supports a large number of invertebrate species. The river contains healthy populations of wild brook trout and mussels. Many vernal pools are located near the river, supporting amphibian species such as wood frogs and spotted salamanders. A large variety of birds nest in the deep forest areas.

- The Nature Conservancy identified the *Pawcatuck River* system as one of the best examples of intact riverine habitat in the Lower New England ecoregion, and thus selected it as a target for conservation. The *Pawcatuck River*'s 300 square mile watershed comprises most of southwestern Rhode Island and extends into Connecticut. It falls within the Pawcatuck Borderlands and supports roughly 70% of Rhode Island's globally-imperiled species of dragonflies and damselflies. In fact, the watershed hosts the largest and perhaps most significant cluster of known breeding sites for the globally-vulnerable Ringed Boghaunter dragonfly (*Williamsonia lintneri*) across the specie's range. Beneath the Pawcatuck watershed, clean groundwater serves as the sole source of drinking water for more than 60,000 local residents.

- The entire three miles of the *Chipuxet River*, from Taylor's Landing to Worden Pond, is undeveloped. This stream is an integral component of the Great Swamp, the largest swamp in the region, which is owned and managed by RI DEM. This Wildlife Management Area encompasses a wide diversity of wetland plants, therefore the habitat supports many aquatic dependent species of invertebrates, birds, mammals, amphibians and reptiles. The area is designated as a National Natural Landmark.

- The *Green Fall-Ashaway River* occurs within one of the largest contiguous forests in southern New England. From its headwaters, much of the river runs through the Pachaug State Forest, which is Connecticut's largest forest, 27,000 acres. The river extends through 5 towns and includes lands within The Pawcatuck Borderland - New England's coastal forest eco-region, dark skies project. The *Green Fall-Ashaway River* is also part of the U.S. Fish and Wildlife Service's new Great Thicket National Wildlife Refuge. Three-quarters of *Green Fall River* flows within the Pachaug-Ledyard block of the 6-state refuge system to help recreate and manage shrubland acreage

Green heron
(Photo credit: Elise Torello)

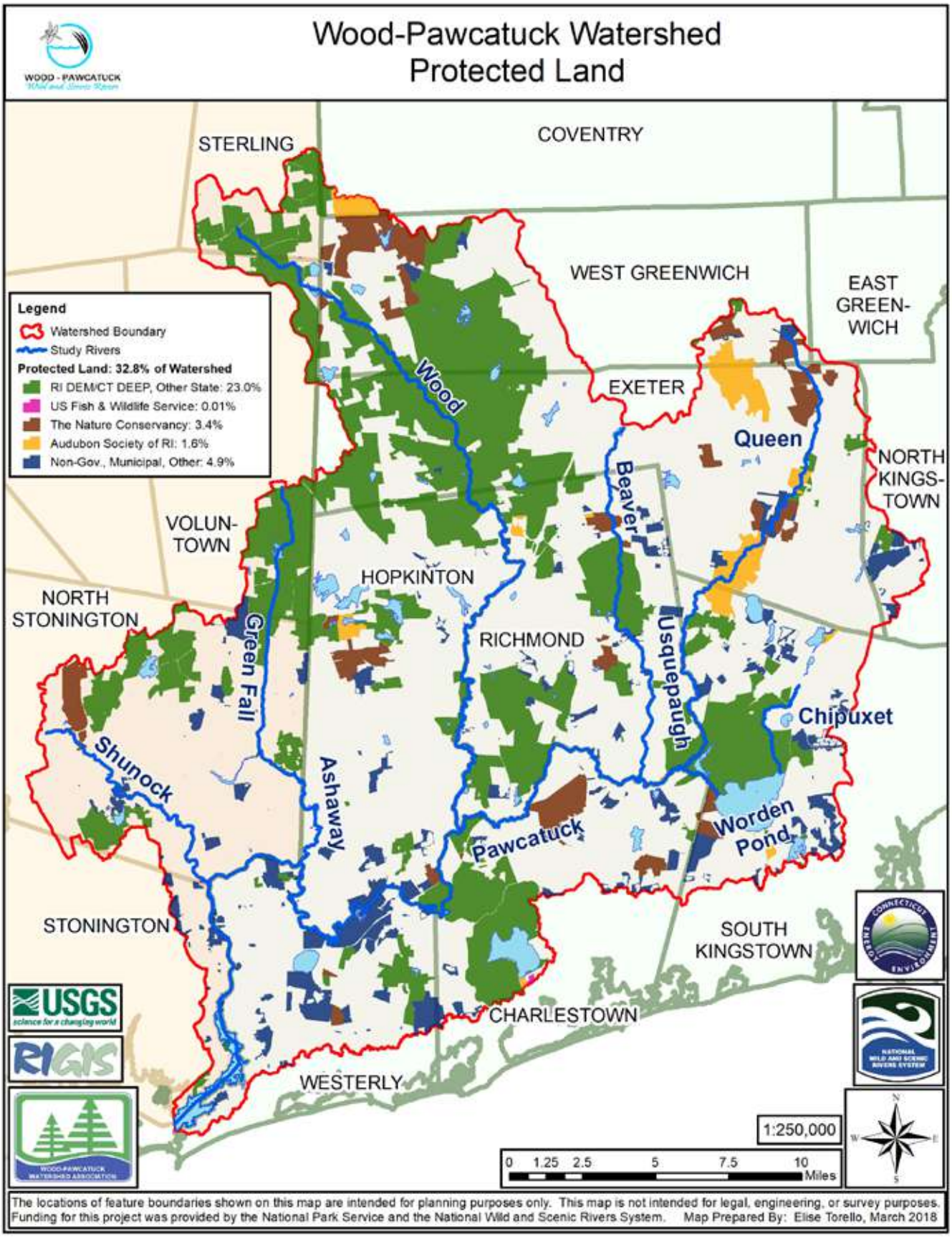


Figure 8. Wood-Pawcatuck Watershed protected land

for over 40 species of wildlife. The goal of this new refuge is to create early successional habitat for a rare native species of rabbit, New England Cottontail, as well as several species of birds that use old fields and scrub-shrub habitats including prairie warbler, blue-winged warbler, field sparrow, American woodcock, and brown thrasher. According to Forest Birds of Connecticut and Rhode Island (Robert Craig, 2017) there are an exceptional number and variety of birds occurring in the newly created North Stonington Wyassup Road Refuge.

Pickerel weed
(Photo Credit: Elise Torello)

- Bell Cedar Swamp is a significant Atlantic White Cedar swamp that drains into the Wyassup Brook and *Green Fall River*. It consists of decomposed peats and deep muck; stagnant slow-moving water; spectacular critical Atlantic White Cedar stands; and other imperiled natural habitats that support endangered, rare and uncommon plants like green adder's mouth orchid, nettled chain fern, and the Hessel's Hairstreak butterfly.

Native rhododendron
(Photo Credit: Elise Torello

- The upper *Wood River* is an exceptional river ecosystem which supports the highest biodiversity of any river in New England. From the headwaters in Sterling, CT to Frying Pan Pond in Richmond and Hopkinton, RI, over 94% of the immediate land use surrounding the river is undeveloped and primarily forested. The river, and its tributaries in the upper section (above Barberville Dam), runs through several thousands of acres of protected properties, including Arcadia and Wickaboxet State Management Areas, TNC's Tillinghast Pond Management Area, URI's Alton Jones Campus in RI; and the Pachaug State Forest in CT. It is part of the TNC Pawcatuck Borderland Project to protect large forested blocks and preserve the "dark sky" nature of the region. Local land trusts from Sterling, CT and Exeter, West Greenwich, Hopkinton, and Richmond own preserves near the *Wood River*.

Cardinal flower
(Photo credit: Margie Parsons)

Marsh violet
(Photo credit: Denise Poyer)

Bur marigold
(Photo credit: Margie Parsons)

- The Nature Conservancy and Audubon Society of RI have protected several large tracts in the *Queen-Usquepaugh River* because of its high biodiversity, especially of dragonflies. According to the RI Odonata Atlas this river is second only to the *Wood River* with the overall number of Odonata species and has the highest number of river species of any river in the region. Several first and second order streams provide clean, cold water throughout the year, making this great habitat for freshwater mussels, brook trout, and amphibians. There is a large pitch pine forest on TNC property with several rare species endemic to that habitat. The lower section of the river is called the *Usquepaugh River*. The last two miles of the *Usquepaugh River* are part of the western border of RI DEM's Great Swamp Wildlife Mangement Area. Both sections are 90% undeveloped.

Odonata (Dragonflies and Damselflies) of the Wood-Pawcatuck Watershed

Virginia Brown

Dragonflies and damselflies are aquatic insects that are found in a wide variety of freshwater, and even in some saltwater, habitats. They are large, colorful, and charismatic, and are voracious predators of other insects in both the winged adult stage and the aquatic larval stage. They are good indicators of a healthy habitat, and many species are sensitive to or intolerant of disturbance in both aquatic and terrestrial habitats.

There are 138 species of dragonflies and damselflies in Rhode Island. Inventory of these insects in all areas of the state has revealed that freshwater systems with the most intact forest and the least amount of development support more species than those that have less forest and more development. The Wood-Pawcatuck Watershed has abundant high quality rivers and streams flowing through large areas of protected forest, and numerous freshwater ponds and wetlands nestled in this matrix of fast moving water habitats. The watershed is host to a rich and abundant odonate (dragonfly) population that includes species found nowhere else in the state, species that are scarce statewide but flourish in the Wood-Pawcatuck system, and species that are intolerant of disturbance.

Dragonhunter (Hagenius brevistylus)
(Photo credit: Denise Poyer)

Compared to other watersheds in the area, the Wood-Pawcatuck supports more species of dragonflies that prefer or are found ex-

Female prince baskettail (Epitheca princeps) (Photo credit: Denise Poyer)

clusively in habitats made up of fast moving freshwater, and more species that are sensitive to pollution, siltation, changes in water temperature, dams, and disturbance of bank and stream vegetation. Of the forty species of dragonflies and damselflies in Rhode Island that can be expected to occur in river habitats, thirty-six, or ninety percent, are found in the Wood-Pawcatuck Watershed. Species that are also found in other watersheds are more abundant in the Wood-Pawcatuck Watershed and occupy more available habitat. Additionally, this is the only watershed in the state that hosts all nine dragonfly species that are intolerant of disturbance factors listed above.

River specialties that occur in the Pawcatuck system but are rare or absent elsewhere include Brook Snaketails (*Ophiogomphus aspersus*), Spine-crowned Clubtails (*Gomphus abbreviatus*), Mustached Clubtails (*Gomphus adelphus*), and Zebra Clubtails (*Stylurus scudderi*). Brook Snaketails are especially sensitive to degradation of river habitat, and are found only in rivers with clean sand deposits.

Dragonflies and damselflies of lakes, ponds, and bogs also find abundant habitat in the Wood-Pawcatuck Watershed. Specialties include three northeast endemic Bluet damselflies (*Enallagma spp.*) that occur in ponds and the Ringed Boghaunter (*Williamsonia lintneri*), a species inhabiting bogs and fens.

The Wood-Pawcatuck Watershed is a critical region for the state's dragonfly and damselfly populations. The long term viability of these insects, as well as other aquatic organisms, depends upon the preservation of clean, undisturbed rivers, ponds, and wetlands. Also critical to the protection of the state's Odonata are the forested uplands that not only maintain water quality, but provide habitat for adult dragonflies and damselflies. In this watershed thousands of acres of land and water are already protected, a significant foundation for the long term conservation of this vibrant group of insects.

Ebony jewelwing damselfly (Calopteryx maculata) (Photo credit: Elise Torello)

Male eastern pondhawk (Erythemis simplicicollis) (Photo credit: Denise Poyer)

The Status of Freshwater Mussels in Rhode Island

Christopher J. Raithel and Raymond H. Hartenstine

[Below are extracts from the article "The Status of Freshwater Mussels in Rhode Island" by Christopher J. Raithel and Raymond H. Hartenstine, published in Northeastern Naturalist, Vol. 13, No. 1 (2006), pp. 103-116. The full text is available at www.jstor.org/stable/4131010]

We obtained data for 199 discrete Rhode Island localities of varying size and visited several of these repeatedly. We surveyed 129 sites completely and had partial data for 70 other sites. We recorded 8 mussel species. Localities with high species richness were confined to the Pawcatuck River and Pawtuxet River Basins. Only the Pawcatuck River Basin supported all local mussel species. Within the Pawcatuck River Basin, we found sites with high (4-5) species richness within the Queen River, Chipuxet River, and Pawcatuck River Sub-basins. The primary epicenters of Rhode Island mussel diversity are presently located in the headwaters of the Pawcatuck River Basin and in the South Branch River Sub-basin of the Pawtuxet River Basin.

Alasmidonta undulata (common name: Triangular Floater) was fairly widespread, occurring at 20 sites (16%), but was usually uncommon at any given site. (Photo Credit: VT Center for Ecostudies)

Anodonta implicata (Alewife Floater) occurred at 12 sites in coastal rivers and ponds. This species occurred in the Pawcatuck River as far upstream as the village of Carolina (Richmond) and northward to Mechanic Street Dam (Hopkinton/ Richmond) in the Wood River. (Photo Credit: CT DEEP)

Elliptio complanata (Eastern Elliptio) was the most widespread species, found in 58% of occupied sites. It was also the only species that could be considered common, vastly outnumbering all other species in mixed assemblages. Sizeable E. complanata populations were located in Worden's Pond (South Kingstown) and two other sites outside the Pawcatuck Basin. (Photo Credit: Wikipedia)

Lampsilis radiata (Eastern Lampmussel) occurred primarily in natural lakes and connecting rivers. It is uncommon and localized, recording this species at only 10 localities within the Pawtuxet River and Pawcatuck River Basins. Within the Pawcatuck River Basin, we found L. radiata only within the natural lakes and connecting rivers that extend from Hundred Acre Pond (South Kingstown) through Thirty Acre Pond (South Kingstown) and, via the Chipuxet River (South Kingstown), to Larkin's Pond (South Kingstown) and Worden's Pond. (Photo Credit: CT DEEP)

Ligumia nasuta (Eastern Pondmussel) was found only within the Pawcatuck River Basin. L. nasuta was moderately common only in Worden's Pond and perhaps at Chapman Pond (Westerly). L. nasuta is one of the most localized and uncommon of Rhode Island's mussels. (Photo Credit: DiscoverLife.org)

Margaritifera margaritifera (Freshwater Pearl Mussel) occurred primarily in headwater streams of the Pawcatuck River Basin, especially in the Wood River Subbasin. M. margaritifera was usually the only species found where it occurred, but we also detected it sparingly within mixed assemblages in the better riffle areas of the lower Pawcatuck River, as at Potter Hill and White Rock (Westerly). Margaritifera margaritifera populations have suffered dramatic declines even within the scope of this survey. Streams within the Arcadia Management Area formerly hosted large populations of M. margaritifera. In the 1980s, this species was so common in the Flat and Falls Rivers (Exeter) that one could not wade without stepping on one. Recently, M. margaritifera has declined to the point of near extirpation in one of those rivers. A population in Beaver River (Richmond) has concurrently declined. (Photo Credit: Wikipedia)

Pyganodon cataracta (Eastern Floater) was the next most widespread species, found at 21% of occupied sites, predominantly in ponds and slow rivers, often in modified habitats (e.g., reservoirs). (Photo Credit: DiscoverLife.org)

Strophitus undulatus (Creeper) was not only localized in distribution, but was also uncommon. We found this species primarily in higher quality riffle areas in larger rivers. The best populations occurred in the Queen River (Pawcatuck River Basin), and two other sites outside the watershed. S. undulatus is so uncommon and localized that its future in Rhode Island seems tenuous. It is clearly one of the highest priorities for mussel conservation in Rhode Island. (Photo Credit: NH Fish & Game)

Although comparisons to the historical era are difficult, we infer that Rhode Island's present mussel fauna has been vastly reduced from its ancestral condition. Of the three largest river systems in Rhode Island, only the Pawcatuck River Basin contains populations of all local mussel species. The most significant concentrations of mussels in this system are presently found in the Queen River and the natural lakes in the upper Pawcatuck River Subbasin. Unfortunately, these lakes are threatened by agricultural run-off and other sources of contamination, as well as from summer water withdrawals that sometimes render connecting streams nearly dry. Several ponds in the upper Pawcatuck River Basin have become obviously more eutrophic since 1980. Mussels depend on stable, relatively clean aquatic habitats. Therefore, even the mussels in the Pawcatuck River Basin are under siege.

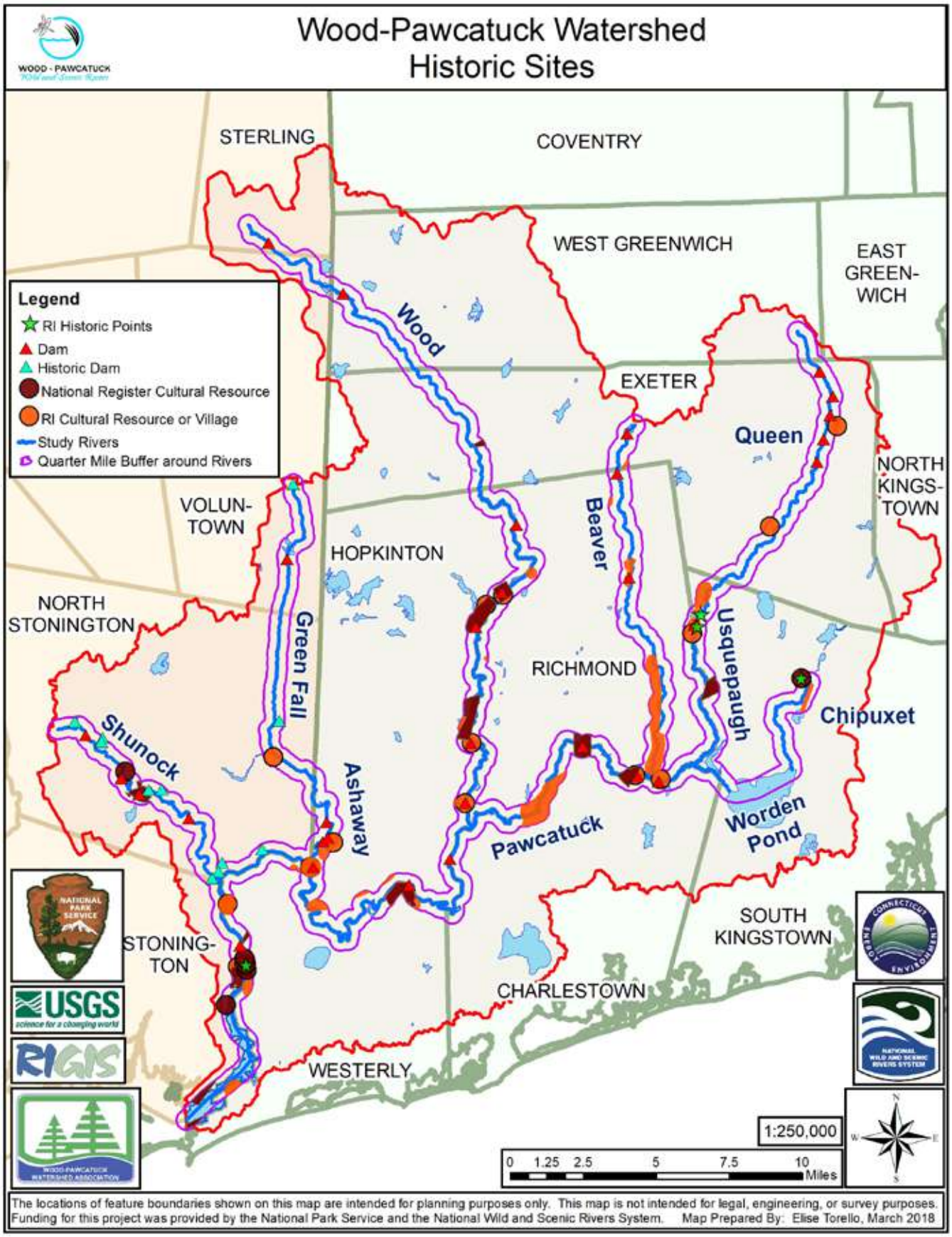


Figure 9. Wood-Pawcatuck Watershed historic sites

Cultural

The abundant wildlife and fish in the region attracted Native American tribes to the Wood-Pawcatuck Watershed, such as the Narragansetts and Pequots. Prior to the arrival of European colonists, there were about 7,000 Native Americans living in southern RI. Many current names in the watershed are Native American in origin.

The colonization of southern Rhode Island began with the arrival of Roger Williams in Wickford in 1637 followed by a multitude of other freethinking settlers and enterprising businessmen. By the mid 18th century these large plantations extended across southern Rhode Island and resulted in an aristocratic plantation culture. Rhode Island was an important part of commerce within the entire Atlantic community. Shipbuilding began in 1681 in Westerly and continued for 200 years. Over 240 vessels were constructed in this area.

At the end of the 18th century political power shifted to the more mercantilist cities such as Newport, Bristol and Providence. The many rivers and streams in the watershed were dammed and used to power over 30 mills. The presence of mills attracted workers from throughout the region. Villages sprang up around the mills. Buildings, dams, and other remnants of these historical sites are present on every river in the watershed. The *Wood*, *Pawcatuck*, *Beaver*, *Shunock* and *Green Fall-Ashaway River*s contain many fine examples of early to late industrial mill buildings and structures. There are many other dams and historic mill artifacts throughout the watershed on tributaries to all seven rivers. While they are not discussed in this document they are still of historic significance.

Important agricultural resources are found on outwash plains near the *Queen-Usquepaugh*, *Chipuxet*, *Beaver*, *Pawcatuck*, and *Green Fall-Ashaway River*s.

Some Key Findings on the Exemplary Status of Cultural resources in the Wood-Pawcatuck Watershed

- The Hillsdale Historic and Archeological District was a center for various kinds of milling, using the *Beaver River* for water power.

North Stonington sawmill
(Courtesy of North Stonington Historical Society

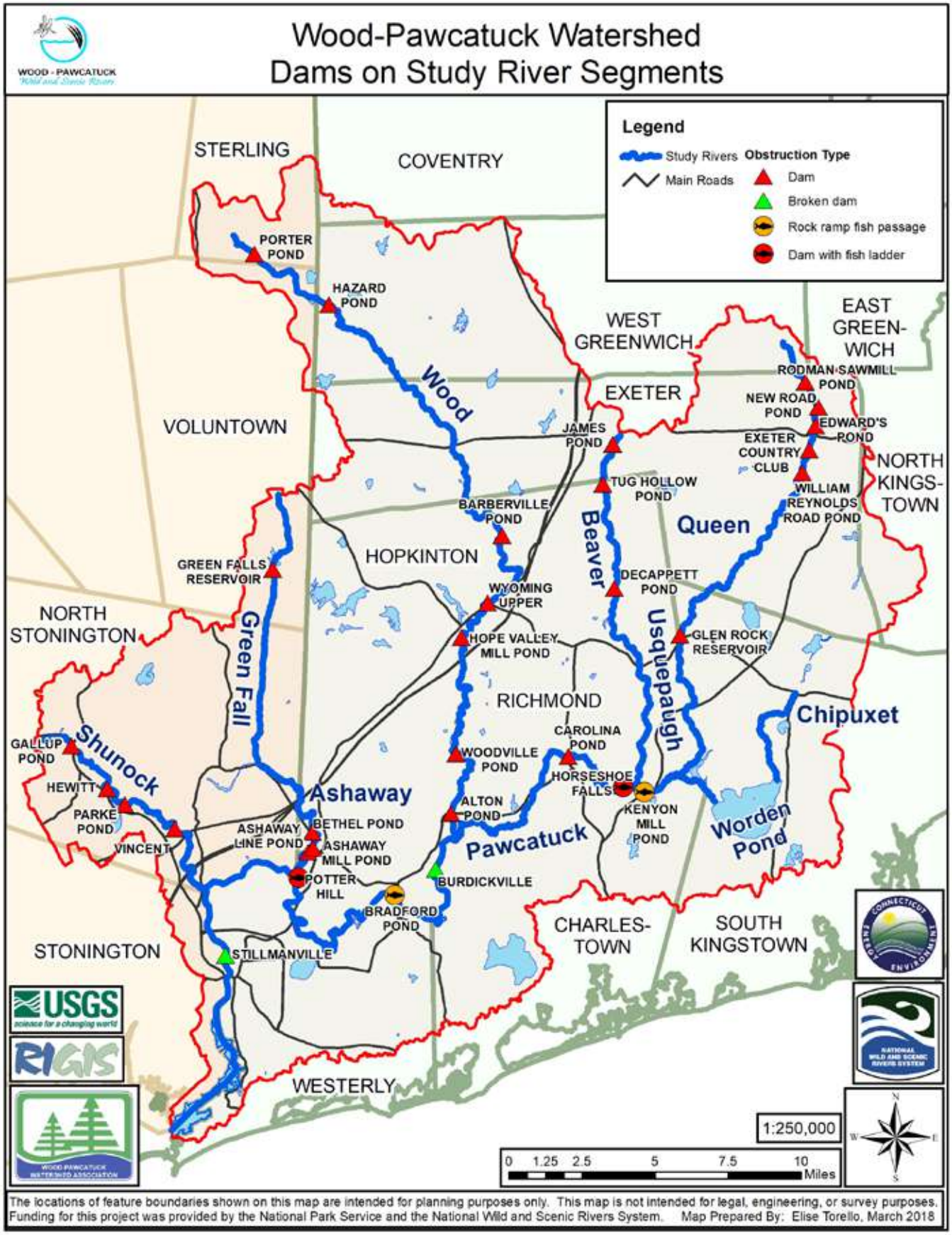
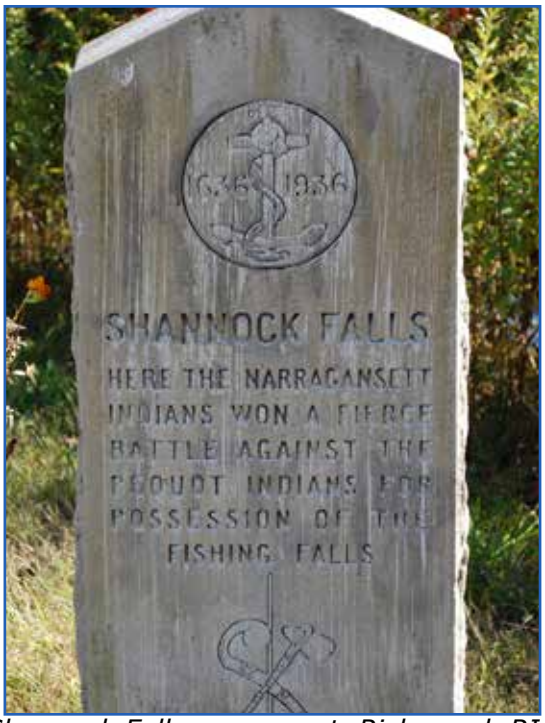


Figure 10. Wood-Pawcatuck Watershed dams and fish passage structures on study river segments

Hillsdale produced textiles, primarily coarse cottons and woolens, in the western part of Richmond during the period 1830 to 1870. Presently the mill village exists as a series of archeological sites: industrial, commercial, and domestic, strung out along Hillsdale Road and set in 68 acres of second growth, hardwood forest. The Historic District is a small portion of a large, 2,000 acre, state-owned wooded tract, the Hillsdale Management Area. The various components of the mill village have been preserved from subsequent reuse or development and feature a high degree of archeological integrity.

- On the *Shunock River* the Avery mill from the very early 1700s was the basis for the first naming, Avery Mill, of what is now North Stonington Village. In fact, the Village of North Stonington had the largest concentration of river dependent industry in the region.

- In this region of CT the *Green Fall River* supplied water for mills that were built both earlier and bigger than mills found on the Shunock. Two fairly complete villages, Clarks Falls and Shady Glen, grew up around the river. These villages had churches, schools, retail stores, large fulling mills and woolen mills. Also, throughout the river there were several little country mills located in the woodlands. Extensive Native American ceremonial stonework in the area includes the Manitou hassunash, the stone groupings and hassuneutunk, the walls and serpent effigy constructions for the Narragansetts. Five working farms still utilize prime agricultural soils that are the results of outwash plains from the retreat of the glaciers. A battle was won by the Narragansett Indians against the Pequot Indians at the lower falls of the *Pawcatuck River* in Shannock for fishing rights. Archeological sites include a shell heap at Pawcatuck Point, burials on the Whit Davis arm, stone tools Rock Site, and a fourth site on Mastuxet Cove.

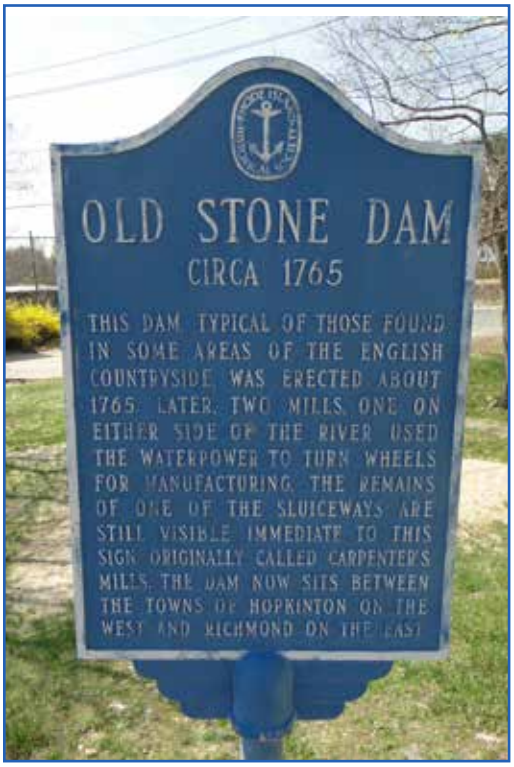


Shannock Falls monument, Richmond, RI (Photo credit: Denise Poyer)

- There are three state documented tribal camping/fishing/settlements of the Pequot and Eastern Pequot Tribes along the *Shunock River*. Ceremonial stone sites are also found throughout the area with more discoveries continuing. Historic early mills and villages were a result of the

socioeconomic impact of the river. North Stonington enjoyed a period of prosperity as a mill town thanks to the abundant water supplied by the *Shunock River* and Assekonk Brook. In fact, the Village of North Stonington had the largest concentration of river dependent industry in the region. A variety of mills sprouted up along the river from the late 1600s through early 1900s. The Avery Mill from the very early 1700s was the basis for the first name, Avery Mills, for what is now North Stonington.

- Two Native American tribes claimed areas near the upper *Wood River* for winter camps. The Mohegan used the section above Baily Pond in Sterling, CT and the Narragansett used the region that started in RI. Along the Step Stone Falls are remnants of an old quarry where bedrock was easily accessible. The foundation for a timber mill using these quarried rocks can be found slightly further downstream. There are seven dams along the *Wood River* with additional dams on the river's tributaries. The numerous waterfalls and small ponds were well adapted for mill wheels. Hope Valley and Wyoming dams supported thriving communities which have been well documented and the Hope Valley and Wyoming Village Historic Districts are listed in the National Register of Historic Places.



Old mill equipment and Mechanic St. dam on the Wood River, Hopkinton, RI (Photo credits: Elise Torello)

Potter Hill Mill, Westerly, RI (Photo credit: Denise Poyer)

Kenyon grist mill (still operating) on the Usquepaugh River, South Kingstown, RI (Photo credit: Elise Torello)

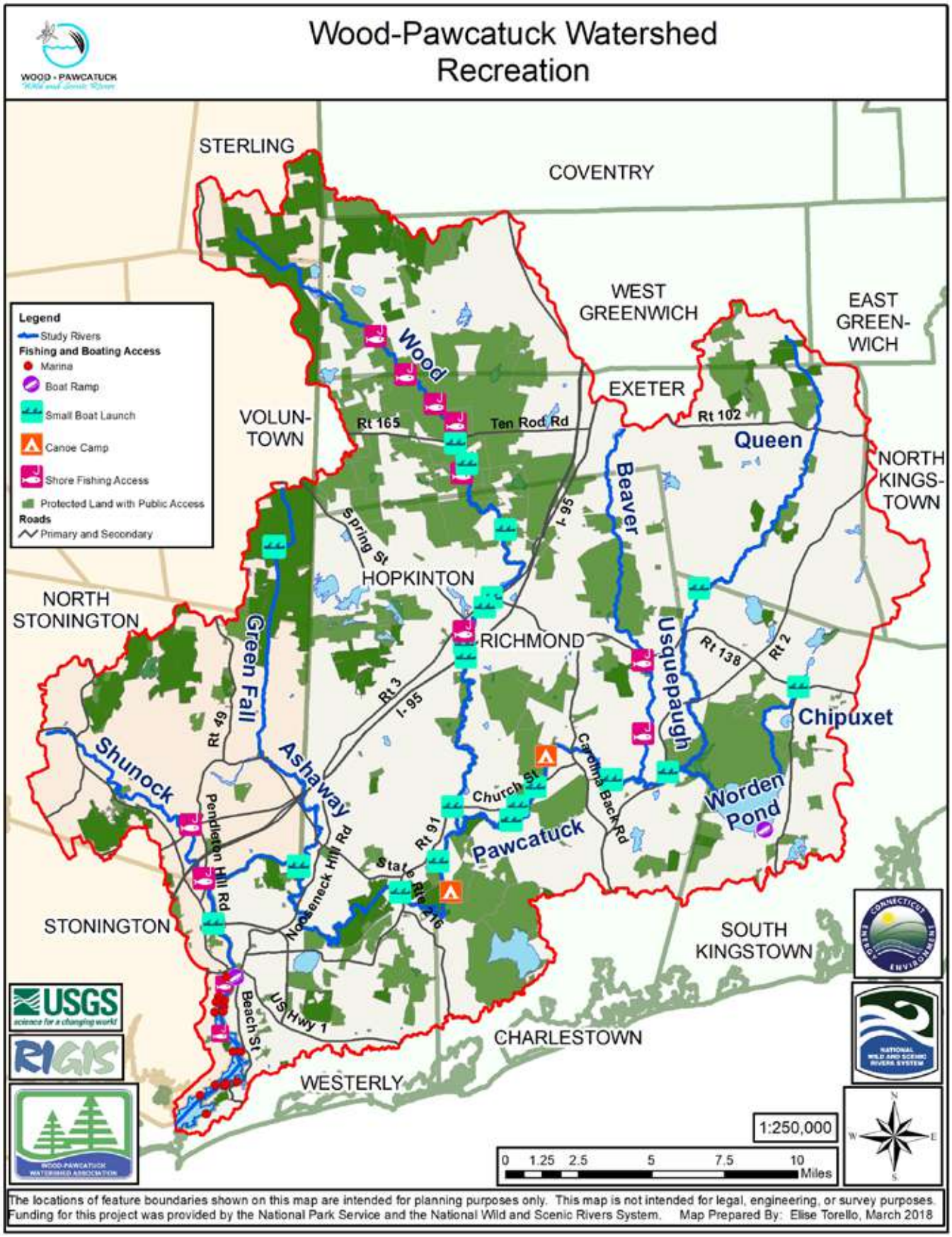


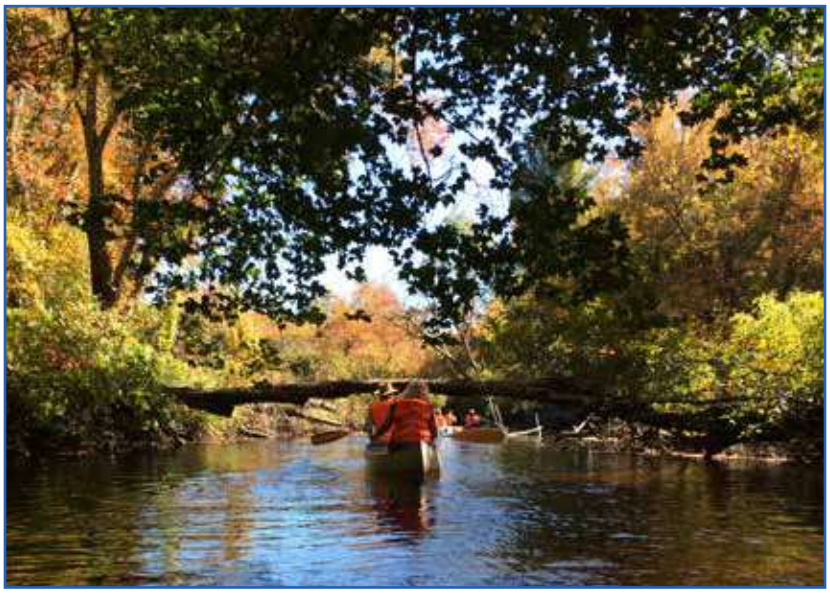
Figure 11. Wood-Pawcatuck Watershed recreational areas, including open space parcels with public access, shore fishing access points, and boat launches

Scenic/Recreation

Aquatic resources in the watershed are highly prized for recreational activities, particularly paddling, fishing, and birding. Thirty-four miles of the *Pawcatuck River* and twenty-four miles of the *Wood River* present exceptionally scenic canoeing and kayaking. The *Wood River* and its tributaries are nationally known as outstanding trout fishing streams. The lower Pawcatuck provides safe harbor for several marinas, with access to Long Island Sound and the Atlantic Ocean. The thousands of acres owned by state and non-government agencies and local land trusts along the rivers offer hundreds of miles of trails for hiking, biking, and birding. State management areas supply ample hunting and fishing for local residents.

Some Key Findings on the Exemplary Status of Scenic and Recreation resources in the Wood-Pawcatuck Watershed

- The *Chipuxet River*'s slow meander through three miles of wetlands provides beautiful scenery for paddlers; opportunities to fish and hunt; and observation of wildlife. The South County Bike Path crosses the *Chipuxet*, giving bikers and walkers a glimpse into a wild system.
- *Green Fall Pond*, remote within Pachaug Forest in Voluntown, is deeply a part of local use and pride. It has a long history of use as a campground, with swimming, canoeing, fishing, and hiking of several surrounding renowned trail systems, a public boat launch, places for hunting, horseback riding and mountain biking. Locals call it their childhood "swimming hole near the ravine."
- The *Pawcatuck River* is a recreation destination. Starting at the mouth of the river, there are fourteen marinas, a public boat launch, parks and nature preserves. Motorized boats are found primarily in the estuary and two short upstream stretches which are deep enough to allow them. Otherwise the *Pawcatuck River* is primarily



Paddlers on the upper Wood River (Photo credit: Elise Torello)

River Paddling

Jim Leigh

Whether you are new to paddling or you are an experienced paddler, the Wood-Pawcatuck Watershed provides a multi-sensory adventure to your river paddle trip. Paddling within this special watershed takes the canoeist, kayaker, and paddle boarder into a resplendent wild and scenic river environment. The rural atmosphere and the feeling of solitude, embraces the human need for relaxation and freedom. Today, the Native American Narragansett people continue to navigate the Wood and Pawcatuck Rivers by canoe. Their primary focus for paddling centers upon recreation, harvesting and ceremony.

Along the river by-ways, flowing tributary waters and small inlets imprint the riverbanks. The rivers are a mixture of smooth flat water, occasional ripples of quick water and minor rapids which can be portaged. The river system offers the paddler two established river camping sites and selected unofficial river pull-out resting stops. According to the Wood-Pawcatuck River Routes Guide there are seventeen miles of canoeable passage on the Wood River, four miles on the Chipuxet River, and forty-six on the Pawcatuck River.

As you paddle through this watershed region, you will encounter a variety of flora and fauna. Grand stately pines, majestic river oaks and an assortment of maples are growing along the rivers. Mountain laurel and rhododendron groves border various riverbanks. Marshes, bogs and vernal pools complement the watershed's unique environment. Also, the watershed offers a protective habitat for a variety of animal river life. Deer, foxes, coyotes and raccoons may be observed along the river. Likewise, nesting ducks, migrating geese, egrets and blue heron occupy the shadows of the river. As a paddler, you may encounter the passage of native and migratory fish such as blueback herring, alewife, American shad, trout and American eels.

A river paddling outing through the Wood-Pawcatuck river system is an extraordinary multi-sensory adventure from the past, for the present and into the future.

Stand up paddleboarders on the Wood River (Photo credit: Elise Torello)

enjoyed by canoists, kayakers, and stand up paddlers. There are two riverfront campsites on the *Pawcatuck River*. They are in the Burlingame and Carolina Management Areas. Nine fishing and boating access points dot the river from Biscuit City Landing to the Westerly Town Dock.

- The *Pawcatuck River*'s scenic beauty is encountered along the entire water byway. The river flows through a rural wooded landscape. This watershed region is one of the few remaining pristine areas between New York and Boston. The water is clean and clear with many transparent views of the riverbed. Alluring marshes and swamps are viewed along the river course. Seasonal changes bring a variety of auditory and visual attractions to the river along with captivating sunrises and sunsets for the river tourist. A mature canopy of trees line the river's forested banks.

- The *Wood River* is a destination river for recreation throughout New England because it is within an hour drive of anywhere in RI and eastern CT. This river has forested banks and clean, cold water, therefore trout can find pools of refuge even in the heat of summer, making this a regional destination for fly fisherman. RI DEM stocks brown, rainbow, and hatchery raised brook trout throughout its length. There are wild brook trout in all the tributaries and upper reaches of the river. A section of the river, from West Greenwich to Exeter, is reserved for catch and release fishing. Canoists and kayakers flock to the *Wood River* to enjoy the experience of a wild, natural river, with its many twists and turns and small class II rapids. Birders can find numerous species of birds along the river banks. The RI North South Trail system runs beside the *Wood River* and many of the tributary streams. People use the river to hunt for small game, deer, and waterfowl.

A group of schoolchildren paddling in Frying Pan Pond (Photo credit: Elise Torello)

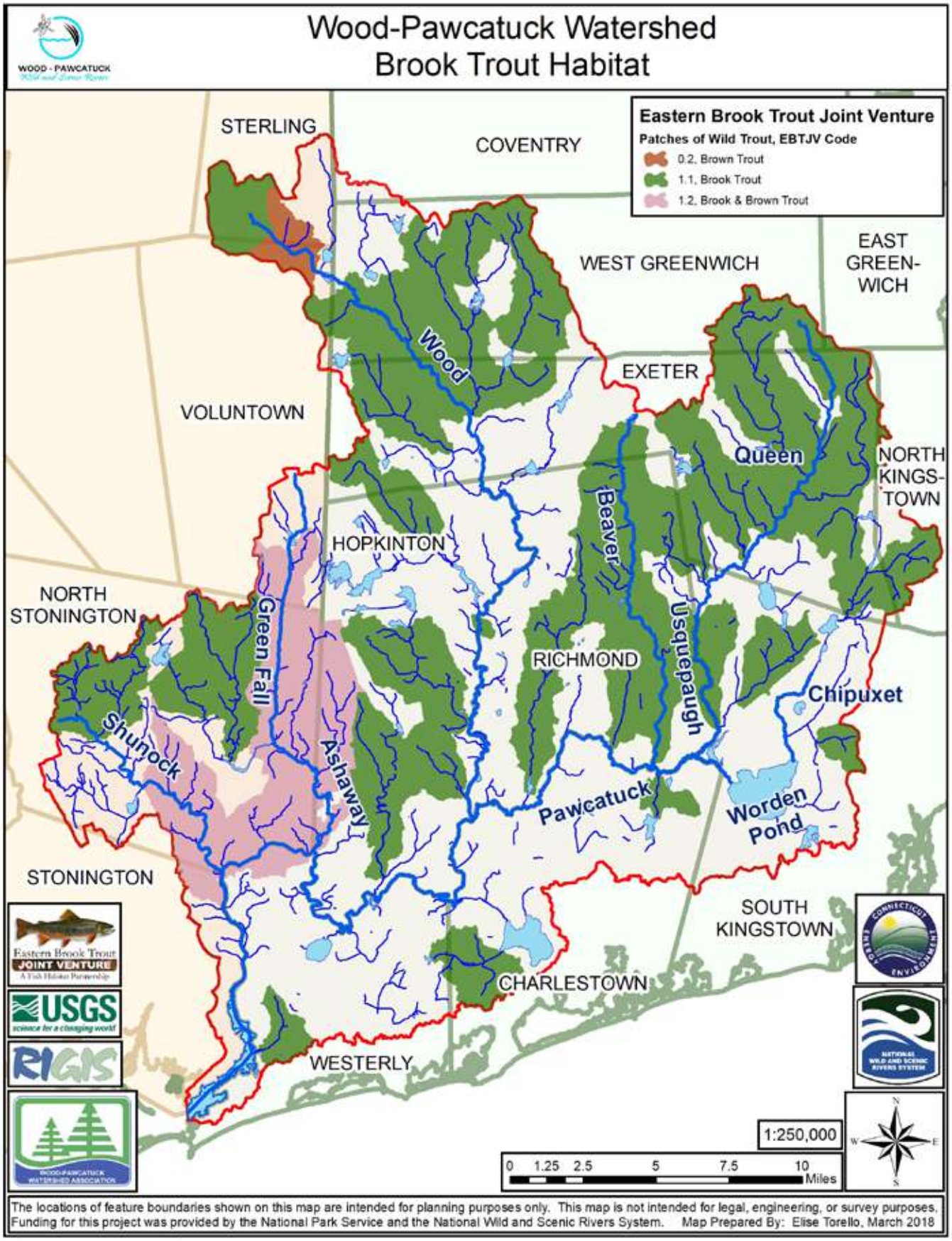


Figure 12. Wood-Pawcatuck Watershed brook trout habitat, from the Eastern Brook Trout Joint Venture

Brook Trout in the Wood-Pawcatuck River Watershed

Corey Pelletier

The Wood-Pawcatuck Watershed provides essential habitat to one of the few native fish species to Rhode Island, the Eastern brook trout. Wild brook trout rely on cold, well oxygenated water for their survival, and Wood-Pawcatuck Watershed provides more of this than any other watershed in the state.

As both an ecologically and recreationally important species, brook trout have been impacted by development and land clearing. They continue to be affected by a variety of natural and anthropogenic factors. Due to the amount of land protected by state and conservation groups, the Wood-Pawcatuck Watershed contains the least impacted forests and waterways in Rhode Island. As a result, this watershed has created a stronghold of wild brook trout populations throughout its network of streams. They can be found from the uppermost reaches of headwaters down to the main stems of the Wood and Pawcatuck Rivers.

Various other watersheds across the state have faced extensive urbanization and degradation of water quality, greatly reducing suitable habitat for wild brook trout. Maintaining the remaining habitat by protecting coldwater streams across Rhode Island is vital. Although the Wood-Pawcatuck Watershed is one of the remaining drainages with abundant coldwater streams and forested riparian networks, still this native fish species is still impacted. Warming waters due to impoundments and climate change pose one of the more challenging impacts to brook trout. Fragmentation of habitat by impassable culverts and dams affect these fish by reduction of movement. Protecting these lands and reducing further degradation is essential for the persistence of this species.

The Wood River Watershed: A Tranquil Hidden Gem for Fly Fishers

Dick Diamond

A brook trout (Photo credit: Richard Benson)

For most fly fishermen living east of the Mississippi, getting to secluded trout waters means leaving the hustle and bustle of urban living behind by driving for hours into the hinterlands or making the long trek to mountainous national parks and forests. This is not the case for southern New England trout anglers. Lying only a few minutes' drive from the roar and rumble of eighteen-wheelers racing north and south on busy Interstate 95, the Wood River Watershed provides a mostly tranquil and frequently solitary year-round fly fishing experience much closer to home.

The Wood River and its smaller tributaries the Falls River, Flat River and Breakheart Brook meander through the heavily forested 14,000 acres of the Arcadia Management Area. While the Management Area provides a rich assortment of recreational opportunities for hiking,

hunting, biking, kayaking and canoeing, the trout fisherman often enjoys having his favorite deep pool or shady run mostly to himself. There are multiple access points and plenty of nearby parking so that the ambitious angler can cover most of the river in a day. Given its location in the center of the smallest state of the union, few Rhode Islanders are more than an hour away.

Except for a brief closure from the last day of February until the second Saturday in April, the Wood River is open for trout fishing year-round. Spring rains can bring occasional high waters, but the river is mostly wadable during the peak season of May through September. The ability to wade safely becomes especially important during the Wood's signature Hexagenia Limbata hatch which occurs nightly at dark during the summer months. During the day, a thick canopy of pines keeps the water sheltered from the heating rays of the sun and insulates the wading fisherman from outside noise and other distractions. A rich diversity of insect hatches, plentiful bait fish and late summer terrestrial activity provide ample opportunities for the dry fly purist, streamer fishermen and nymphing specialists.

The Wood River Fly Fishing Club regularly assists in generously stocking the Wood River with quality Rainbow and Brown trout from state hatcheries. While the state no longer stocks Brook Trout, there are plenty of colorful wild Brook Trout scattered throughout the watershed to challenge fly fishers. Narragansett Chapter of Trout Unlimited provides volunteers and other support for improving the habitat and enhancing the fishery.

All things considered, southern New England fly fishermen are fortunate indeed to have easy year-round access to a nearby New England trout stream and all the beauty of nature it provides.

Table 1. Outstandingly Remarkable Values (ORVs)

River Segment	ORV Category	Landscape Feature	Area of Comparison	Unique/Rare/ Exemplary
Watershed	Geology/ Hydrology	Recessional moraine forming the Great Swamp, Cedar Swamp, and Chapman Swamp; sole source aquifer. High water quality for most of the surface water	New England	Unique
	Ecology	Critical habitat contains large forested blocks and multiple wetlands; fifty percent of the regions rare and endangered species; part of the New England dark sky region	Southern New England	Rare
	Cultural	Native American archeological sites; assemblage of historic mill villages	New England	Exemplary

River Segment	ORV Category	Landscape Feature	Area of Comparison	Unique/Rare/ Exemplary
	Recreation/ Scenic	Over fifty-six miles for boat passage; river corridors provide fishing, hunting, birding, hiking, and camping	Southern New England	Exemplary
Beaver River	Ecology	91% undeveloped, large areas of unbroken forested blocks; cold, clean water habitat supporting invertebrates, wild brook trout	Southern New England	Exemplary
	Cultural	Hillsdale Historic and Archaeological District	New England	Exemplary
Chipuxet River	Ecology	Undeveloped three miles of the river form a key part of the Great Swamp; National Natural Landmark	New England	Exemplary
	Recreation	Slow meander allows for scenic paddling, hunting, fishing, birding	Southern New England	Exemplary
Green Fall River	Geology/ Hydrology	Green Fall Rift Valley	Southern New England	Rare
	Cultural	Clarks Falls and Shady Glen mill villages	Southern New England	Exemplary
	Recreation	Green Fall Recreation Area	Southern New England	Exemplary
Pawcatuck River	Geology	Worden Pond – largest freshwater lake in Rhode Island; Charlestown Moraine creates east-west passage and many large swamps	New England	Unique
	Cultural	Narragansett Indian archaeological sites at Pawcatuck; nine historic mill sites; historic ship building	New England	Exemplary
	Recreation	boating; fishing; hunting; camping	Southern New England	Exemplary
	Scenic	Marshes and swamps along the waterway, rural wooded landscape	Southern New England	Exemplary

River Segment	ORV Category	Landscape Feature	Area of Comparison	Unique/Rare/ Exemplary
Queen-Usgeu-paugh River	Ecology	Highest river Odonata count in the region; high number of freshwater mussel species; West-ern border of the Great Swamp; National Natural Landmark	New England	Rare
	Geology/ Hydrology	Headwaters of the Queen River - Dead Swamp	Southern New England	Unique
Shunock River	Ecology	Cold water fisheries, CT DEEP Class 3 Wild Trout Management Area	Southern New England	Exemplary
	Cultural	Three state-documented tribal settlements of the Pequot and Eastern Pequot Tribes; early mill villages established the town of North Stoning-ton	New England	Exemplary
Wood River	Ecology	Upper Wood River sup-ports the highest bio-diversity of any river in New England	New England	Unique
	Ecology	Large tracts of undevel-oped forests; contains over fifty percent of the regions rare and endan-gered species	Southern New England	Unique
	Recreation	Fly fishing; popular for kayaking due to scenic resources	Southern New England	Exemplary
	Cultural	Native American quarry site and winter camps; seven historic mill vil-lages	Southern New England	Exemplary
	Scenic	Forests, wetlands, wild-life viewing	Southern New England	Exemplary

Beaver in the Wood-Pawcatuck Watershed

Charles Brown

The American beaver (*Castor canadensis*) was likely common throughout the Wood-Pawcatuck Watershed and much of North America prior to the arrival and settlement of Europeans on the continent. Beavers were an important resource for native peoples who utilized the meat, fur, and castoreum (an oily substance secreted by beaver that is often used in perfumes). An insatiable demand for their fur in Europe led to exploitation by native peoples to trade for European goods, and later by European settlers, eventually leading to their extirpation over much of their range. While they could be found in northern areas, they completely moved out of southern New England. It is not known when beavers disappeared from what is now Rhode Island, but given our knowledge of the early fur trade and considering the state's proximity to the coast, beavers were probably gone from the area prior to 1700.

The beaver is North America's largest rodent. It is not uncommon for adults to weigh more than sixty pounds. They live in extended family groups of five to eight individuals called colonies, which typically consist of an adult pair and offspring, called kits, from the prior year and from the current year. Young beavers remain in the family group until they are two years old, at which time they leave or are forced out by their parents. They disperse to find suitable habitat elsewhere to establish their own territory and find a mate. Beavers are territorial, and will vigorously defend their territory from other beavers.

In 1976, the DEM's Division of Fish and Wildlife documented the first beaver colony in Rhode Island in modern times, within the Moosup River system in western Coventry. Beavers had colonized the area from the Quinebaug watershed in Connecticut. Over the next 20 years beaver populations expanded throughout the Moosup River system and other watersheds within Rhode Island including the Wood-Pawcatuck. A survey conducted by the Division of Fish and Wildlife in the winter of 2006-07, documented over 90 active colonies throughout the Pawcatuck watershed. Today, beavers continue to expand into new areas of the state.

Beavers can profoundly impact their environment by building dams and cutting trees and woody vegetation. Areas impounded by beavers create important habitat for a variety of wildlife species, and recharge groundwater. Impounded areas provide a refuge for trout and other fish species during times of drought. Sediment that settles behind dams provides nutrients that are exposed when water levels recede, creating meadows rich with a wide variety of plant and animal life.

Beaver activity on the Pawcatuck River (Photo credit: Elise Torello)

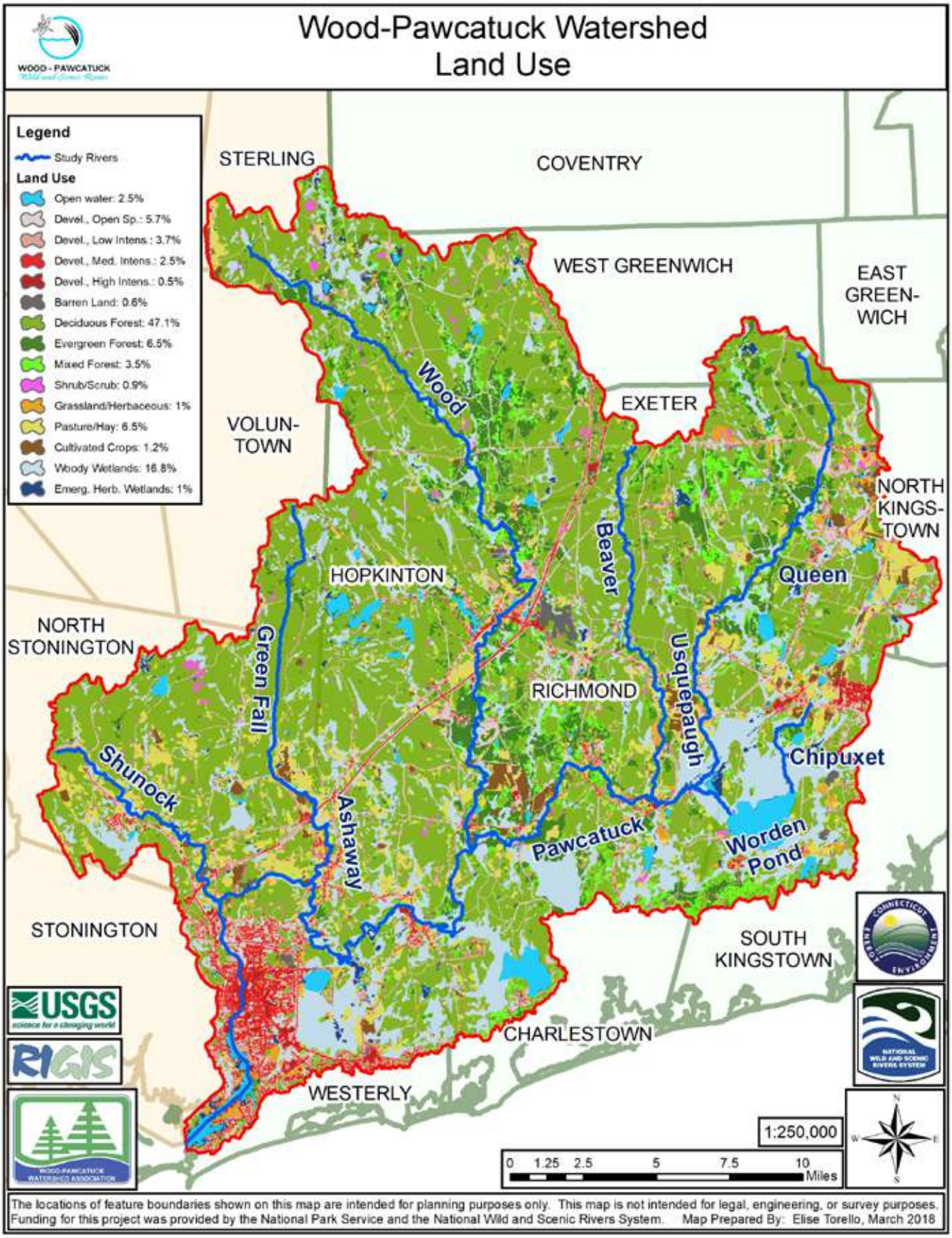


Figure 13. Wood-Pawcatuck Watershed land use, from the USGS National Land Cover Dataset 2011

The Watershed

The Pawcatuck River and its associated tributaries run through a rural wooded landscape amongst a series of towns that grew up on the banks of the watercourses, historically as mill villages. The watershed is the most rural, least developed in Rhode Island with approximately eighty-seven percent of the land undeveloped or in agriculture and approximately seventy-five percent forested. Much of the Connecticut portion of the watershed is also undeveloped due to the protection of the Pachaug State Forest and the Green Falls Recreation Area. (Undeveloped is a Land Use category defined as forest, shrubs, cultivated fields, grasslands, hay, wetlands and open water. Developed is defined as low, medium, and high density, open space associated with developments, golf courses, ball fields, and barren land.) Five segments under study – Beaver River, Chipuxet River, and the first segments of the Queen-Usquepaugh, Wood, and Pawcatuck Rivers – are at least ninety percent undeveloped. The estuary of the Pawcatuck River winds its way through the more highly developed communities of Pawcatuck, Connecticut and Westerly, Rhode Island. Development pressure is high in this region as is typical in the states along the Atlantic coastline.

Watershed species diversity relates to the water and land's unspoiled character and large variety of high quality habitat types including pitch pine barrens, rhododendron swamps, laurel thickets, flood plain forests, marshes, bogs, fens, hundreds of vernal pools, crystal clear ponds, an estuary and some of the region's largest Atlantic white cedar evergreen swamps.

Occupying a narrow band from southern Maine to Florida, some of the largest stands of Atlantic White Cedar are found in the Pawcatuck River watershed at such places as the Great Swamp (found on the Chipuxet River, a Pawcatuck tributary, this swamp is the largest in New England and is a National Natural Landmark), Indian Cedar Swamp, and Chapman's Swamp in Westerly. Forests of white Cedar provide a specialized habitat for many organisms, including the Hessel's Hairstreak butterfly. Some of these species feed exclusively on cedar foliage.

Also of particular note is the existence of one of the largest deciduous floodplain forests in Rhode Island, of more than 300 acres. Located near the headwaters of the Pawcatuck, it is potentially the highest quality swamp site in Rhode Island and is a prime example of pre-European settlement vegetation due to the complete lack of development. The Great Swamp is a Rhode Island State Management Area and is one of the only New England nesting sites of the prothonotary warbler.

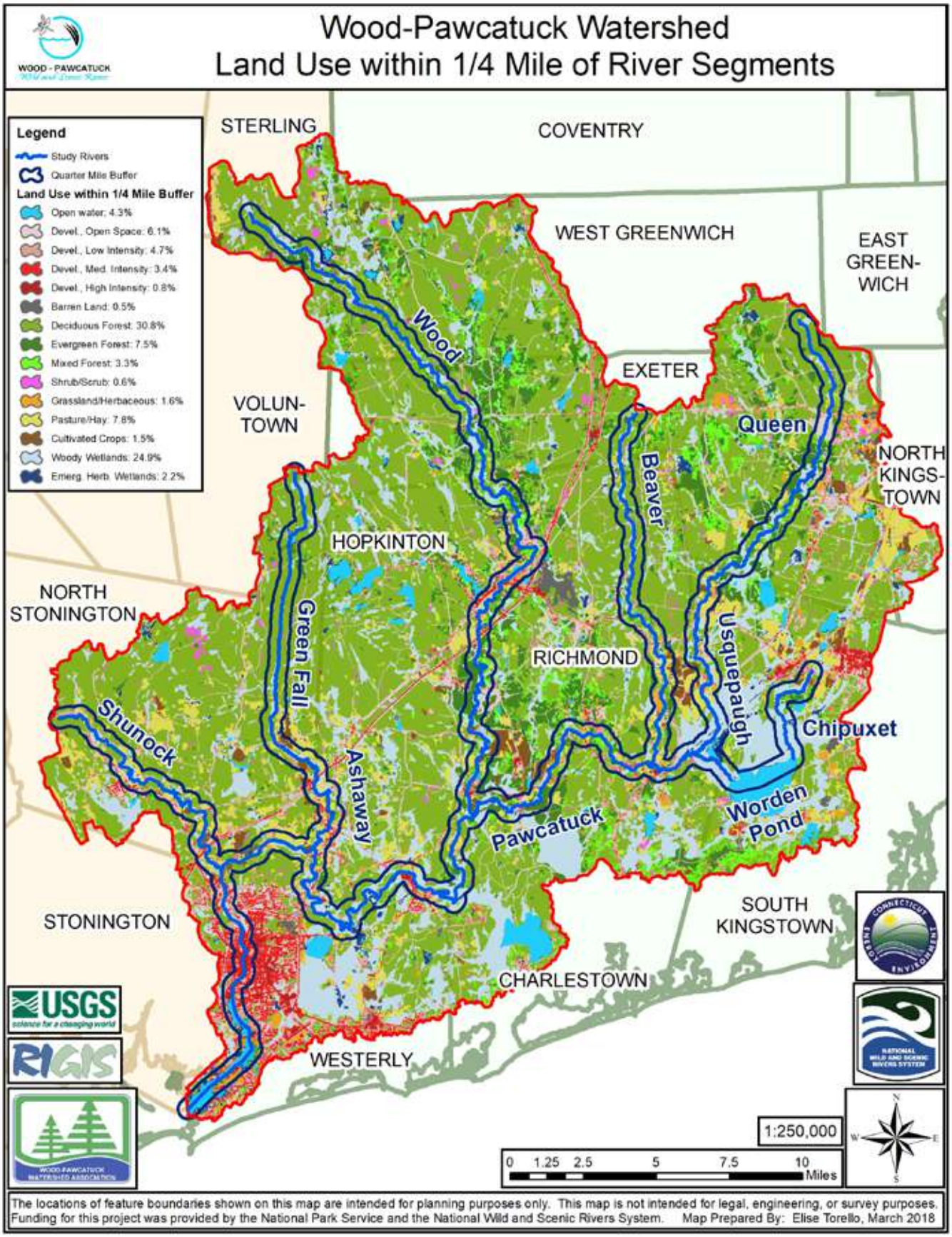


Figure 14. Wood-Pawcatuck land use within 1/4 mile of the study rivers

According to the 1999 Pawcatuck Watershed Report, seventy-five percent of all animal species found in Rhode Island occur within the watershed - this includes 36 mammals, 16 amphibians, 18 reptiles, 123 nesting birds, 33 freshwater fish and thousands of insects. Some of the species found here such as nesting neotropical migrant birds, freshwater mussels, river invertebrates, reptiles and amphibians rely on a landscape of large undisturbed areas for survival.

About "…70 percent of Rhode Island's globally rare (generally found at fewer than 100 sites, worldwide) and 63 percent of its rare species and natural community occurrences are found within the Pawcatuck watershed." Of the 397 plant and animal species listed in the Rhode Island Heritage database, 197 of them are found in the Wood-Pawcatuck Watershed. Some species of note are the sandplain gerardia, northern parula warbler, etuberlated rush, eastern spadefoot toad, spatterdock darner, eastern pearlshell and pale green pinion moth. They are not found elsewhere in the state.

In the eighteenth and nineteenth centuries, European communities developed as mill villages along the watershed's rivers to harness water power for saw, grist and carding mills. This assembly of historical mill villages in both Connecticut and Rhode Island was identified by the National Park Service for a potential Thematic Group designation on the National Register of Historic Places. Kenyon's Grist Mill, located at the site of Glen Rock Reservoir in Usquepaugh Village, is the oldest manufacturing business, and the second oldest in continuous operation, in Rhode Island. Grain is milled on the original granite millstones quarried from Westerly, Rhode Island. Shunock Village was originally referred to as "Mill Village" due to the collection numerous of mills in the heart of the town. There is a long tradition of ship building and boat yards in this area near the coastal locations in the watershed. Dating back to 1680, ship building was the most popular occupation. Although there is no longer

Shunock River near North Stonington Village Green, CT (Photo Credit: Madeline Jeffery)

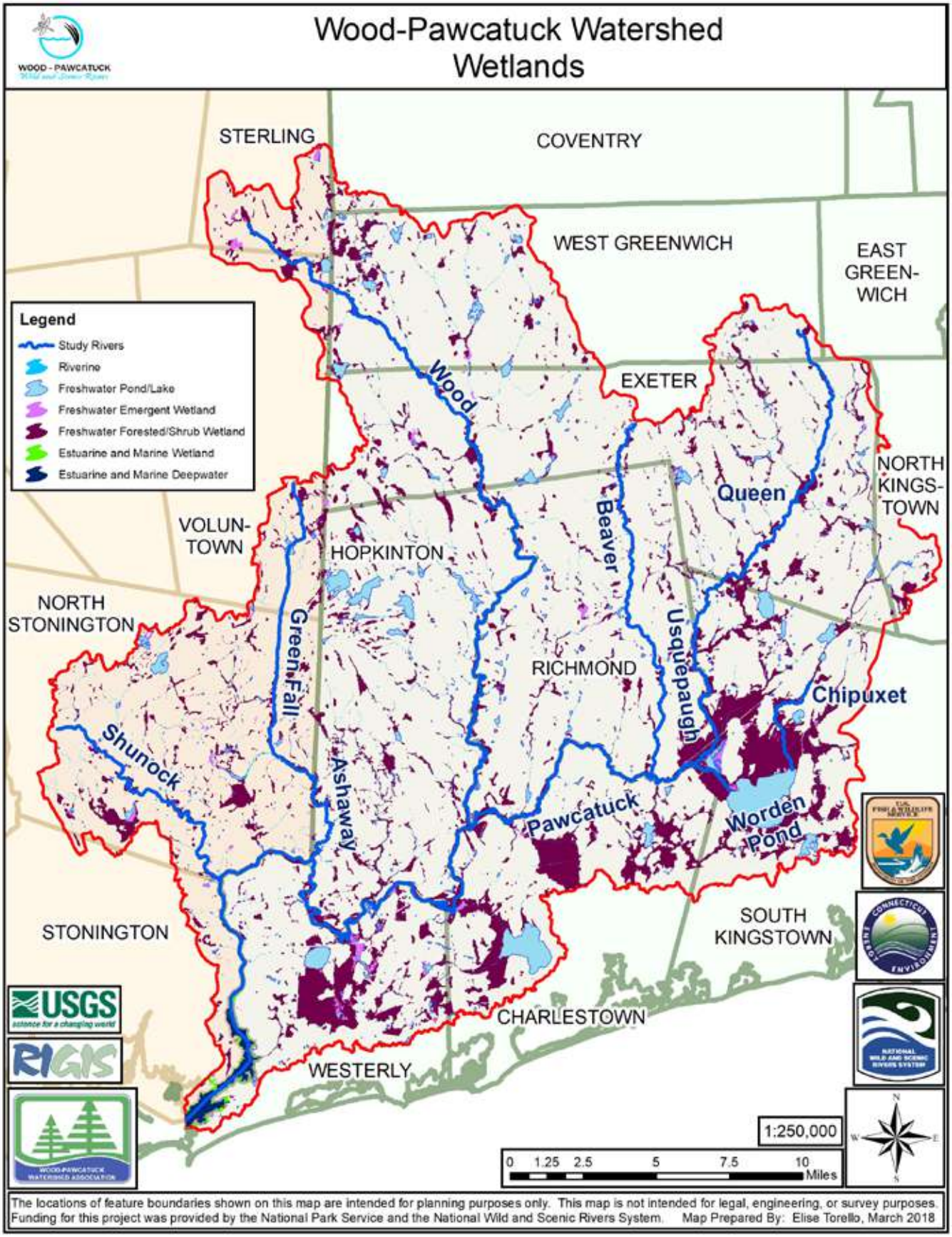


Figure 15. Wood-Pawcatuck wetlands from the US Fish and Wildlife Service National Wetlands Inventory

any ship building, there are still a number of boat yards and marinas in the estuary.

The region is also popular for recreation. The forested scenery is the backdrop that creates an enjoyable environment for recreating on and beside the Wood and Pawcatuck Rivers and their tributaries, and the unspoiled quality of the landscape contributes to the recreational experience. Some of the most popular recreational activities of the Wood-Pawcatuck Watershed include paddling, fishing and hiking. Other popular recreational pursuits include camping, hunting, wildlife viewing, and photography. The rivers' high water quality supports recreational use.

The watershed has about fifty-two miles of primarily flat paddling water with some limited Class II rapids. There are a large number of access points to the river, along with eleven ponds with public access, two state parks, and eight state management areas. The removal of the Lower Shannock Dam has resulted in a new fast-water recreational feature for kayakers.

Wood-Pawcatuck Watershed Association (WPWA) has a fleet of canoes and kayaks stored on their campus on the banks of the Wood River for their educational and recreational programs. WPWA produces the Wood-Pawcatuck River Guide and water trail maps for the Wood River. Paddling provides exceptional wildlife viewing opportunities as well as the ability to view some of the historical mill sites. Fairly narrow watercourses with heavily vegetated banks provide a unique backwoods paddling experience. A sense of solitude can be achieved in the midst of a densely populated region of southern New England.

Paddling opportunities are promoted locally and regionally, and paddling on Rhode Island's many water trails has been identified by National Geographic Society (NGS) as a "Best Adventure Destination" of 2012. NGS refers to the Rhode Island Blueways Alliance, which has mapped the paddling links between the many miles of coastline with the rivers of Rhode Island.

Kayaker enjoying running the broken Burdickville Dam on the Pawcatuck River (Photo credit: Denise Poyer)

There is an outstanding New England sports fishery here due

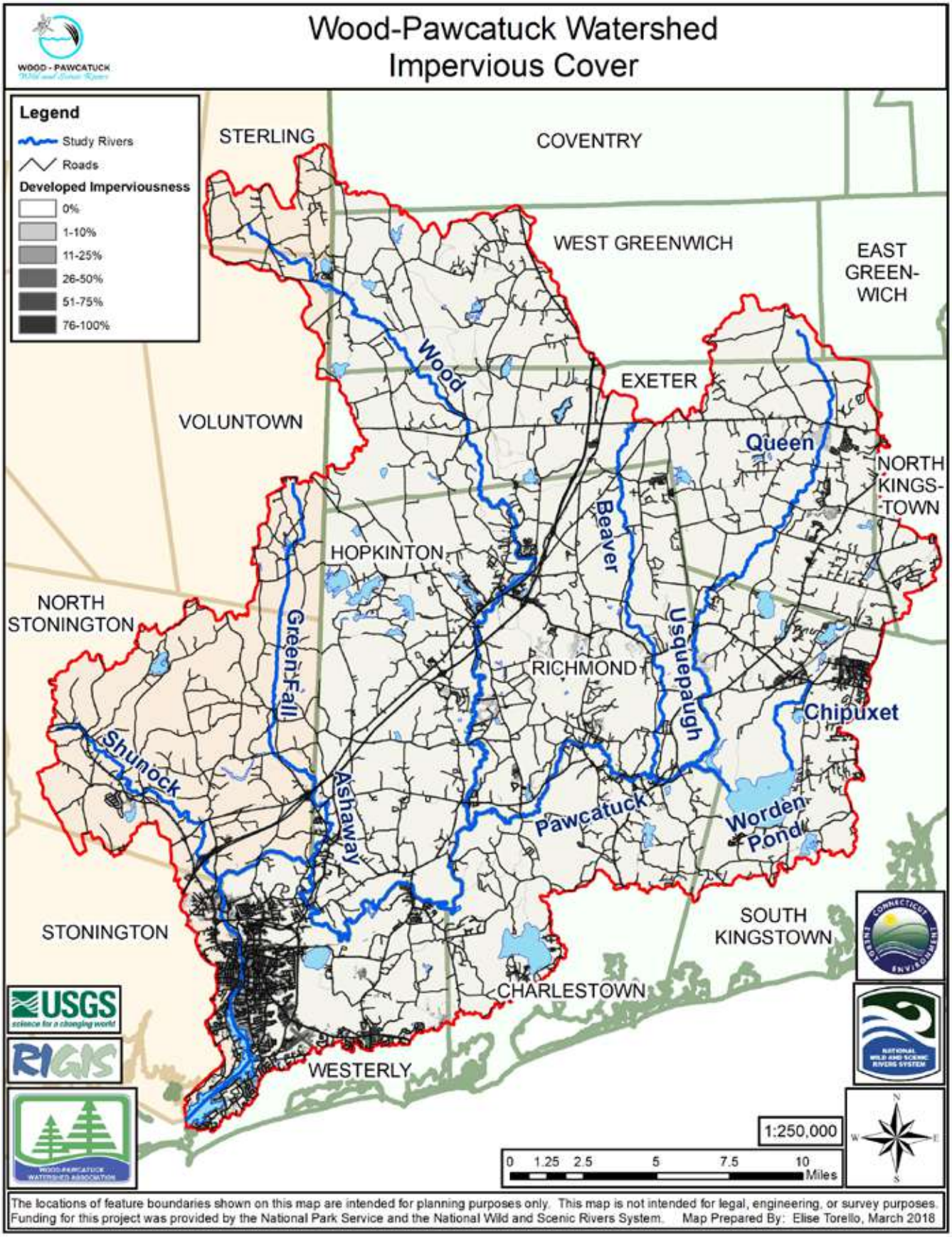


Figure 16. Wood-Pawcatuck Watershed impervious cover, from the National Land Cover Dataset 2011

to the significant cold water trout fishery that includes a wild brook trout population. The Shunock River is a Class 3 Wild Trout Management Area, with both wild and hatchery raised trout. The Wood River and tributaries of both the Wood and Pawcatuck Rivers are the most heavily RI DEM trout-stocked rivers in the state. Multiple efforts to remove dams and provide fish passage have resulted in some fish restoration successes for diadromous fish (see free-flow analysis section for details). There has been great success restoring a self sustaining shad population to the Pawcatuck River with help from a restocking program.

THE RIVERS

River Names: The names of two of the rivers provide a little difficulty. The Green Fall River is also referred to on some maps as the Green Falls River. Likewise the Queen River often had an "s" at the end. The Study Committee decided to use the United States Geological Survey (USGS) topographic maps' naming convention for these rivers, which leaves the "s" off. Also, the Queen River, which runs from Exeter and West Greenwich to South Kingstown, RI is divided into two different names on the USGS topographic maps. From its headwaters to the Glen Rock Dam, it is called the Queen River. From below the Glen Rock Dam to its confluence with the Pawcatuck River it is called the Usquepaugh River. However, it is essentially the same river. Both sections contain Outstandingly Remarkable Values (ORVs) that the Study Committee determined were important to protect. Therefore, for the purpose of this report the entire river will be referred to as the Queen-Usquepaugh River. However, segments may be referred to separately in the tables for ORVs and Classifications.

The Green Fall River flows from Voluntown, CT to its confluence with the Ashaway River. The Ashaway River then flows for three more miles to its confluence with the Pawcatuck River. The Study Committee decided to include this section of the Ashaway River so that the Green Fall River has a connection to the Pawcatuck River and allows better protection of the ORVs. Therefore the river will be referred to as the Green Fall-Ashaway River.

Painting of Stepstone Falls on the Wood River by Susan Shaw

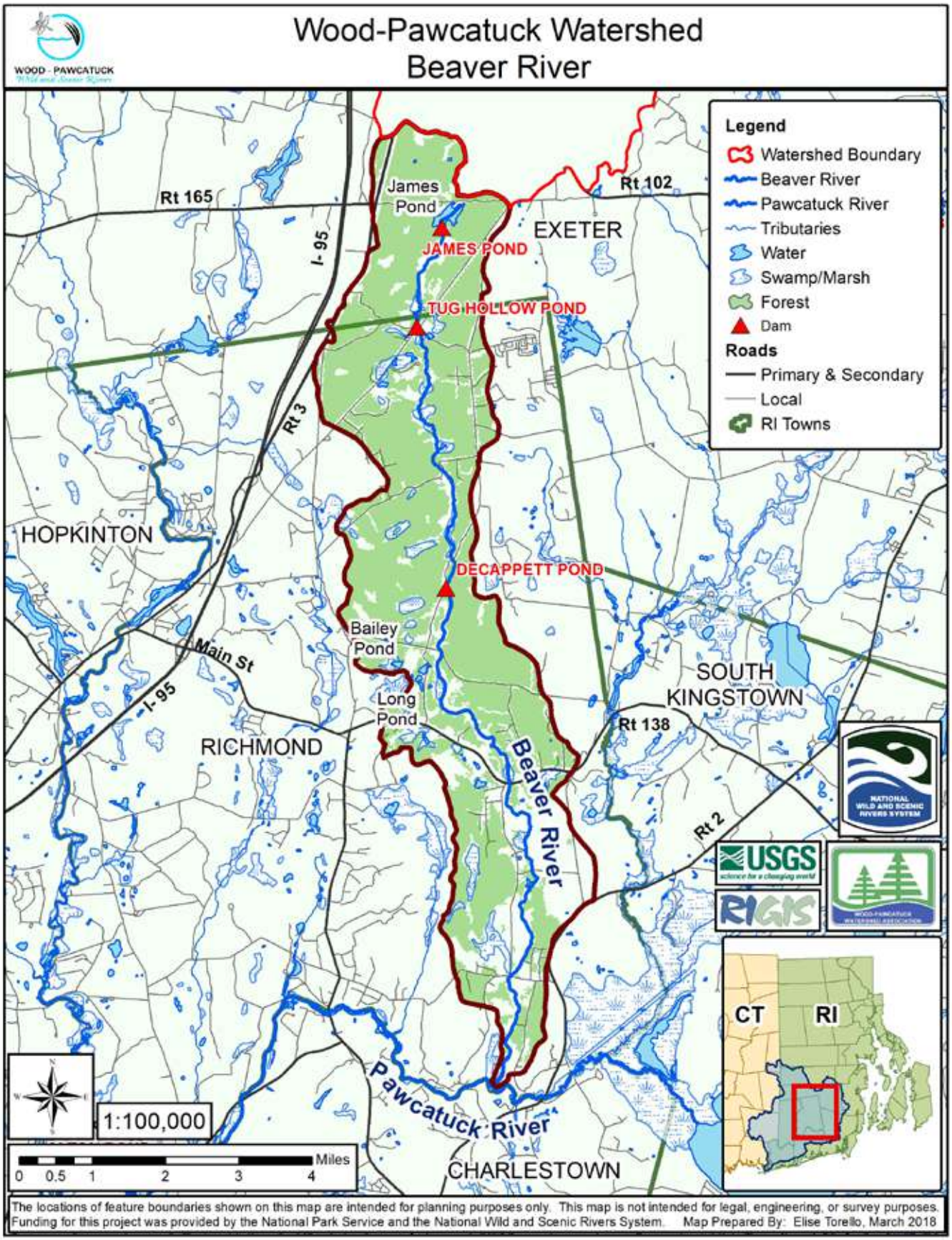


Figure 17. Beaver River and its sub-basin

Beaver River

The Beaver River runs approximately eleven miles from James Pond on the Exeter/West Greenwich line, through the center of Richmond, to its outlet into the Pawcatuck River at the Richmond/Charlestown town line. Much of the Beaver River passes through several protected areas including The Nature Conservancy's (TNC) Beaver River and Grassy Pond Preserves and the RI DEM Hillsdale Management Area (formerly known as the Thaddeus DeCoppet Estate). The Beaver River contains a large population of wild brook trout. The southern reaches of the river are fairly flat, and supply irrigation water for adjacent agricultural fields. Wetlands dominate the surrounding land as the stream nears the Pawcatuck River. It is classified as Scenic because there are several roads and small dams that allow access to the river, and homes abut much of this segment. However, 91% of the river corridor remains undeveloped.

Outstandingly Remarkable Values

Ecology – The Beaver River is ninety-one percent undeveloped and heavily forested. Nearly half the river runs through protected properties managed by RI DEM, TNC and the Richmond Rural Preservation Land Trust. Large patches of contiguous forest along the Beaver River provide clean, cold water habitat that supports a diversity of invertebrates intolerant of disturbance. The river contains sustainable, abundant populations of wild brook trout and mussels. The contiguous forested habitats near the river support large populations of obligate vernal pool amphibians, such as wood frogs and spotted salamanders. The diversity of habitats along the river provides critical habitat for a wide variety of breeding birds that winter in the neotropics, as well as nearctic migrants and resident birds.

Cultural – The Hillsdale Historic and Archeological District in Richmond, Rhode Island was added to the National Register of Historic Places in 1980. Originally a grist mill, the site was converted to a wool-carding mill in 1828, then a textile mill that produced coarse cotton and woolen cloth. Presently the mill village exists as a series of archeological sites that include industrial, commercial, and domestic structures along Hillsdale Road, within sixty-eight acres of second growth, hardwood forest. The Historic District is a small portion of a large, 2,000 acre, state-owned wooded tract, the Hillsdale Management Area. The various components of the mill village have been preserved from subsequent reuse or development and feature a high degree of archeological integrity.

Beaver River at Shannock Hill Rd., Richmond, RI (Photo credit: Elise Torello)

Beaver River at RI Rt. 138, Richmond, RI (Photo credit: Elise Torello)

Historic Mill Villages in Rhode Island

Jeffrey D. Emidy

The watercourses of Rhode Island have been instrumental in the development patterns of the state. From the heavily industrialized Blackstone River in the northern part of the state to the Wood-Pawcatuck River in the south and throughout the watersheds in between, rivers and streams provided a number of resources that were the catalysts for agricultural, industrial, and residential development.

In the seventeenth and eighteenth centuries, Rhode Island's stream and river valleys proved to be successful agricultural areas, and sparse development resulted. The watercourses flowing through these valleys provided power to gristmills and sawmills that supported the agricultural economy.

The nineteenth century saw the birth and maturation of the cotton and woolen textile industries in Rhode Island (and the United States), beginning with the Slater Mill in Pawtucket. Early, small milling successes often proved the viability of their water supplies for expanded uses. Dams were built and controls were put on the water to provide more consistent flow rates that would be reliable through seasonal water level fluctuations. Water from the rivers and streams was used in manufacturing processes, and the wastes of those processes were released back into the same waterways.

The establishment of textile processing or manufacturing on a river or stream necessitated other forms of development: transportation for raw and finished materials and for workers, housing, stores, churches, schools, and recreation. Soon, an industrial site became a village. The mill village form that developed in the Blackstone Valley was replicated throughout Rhode Island and the region. As the size and number of industrial concerns grew, so did the villages. Some of Rhode Island's smaller water courses spawned small, isolated villages, while larger rivers were intensively harnessed for industrial development and became the cities of the late nineteenth and twentieth centuries.

Mill villages large and small were the driving forces in the economy of Rhode Island in the nineteenth and early twentieth centuries and are largely responsible for much of the village-to-town-to-city development pattern that still defines the state today. While the companies in the mills may have moved on, the characteristic mill village collection of buildings remains to remind us of the state's industrial past, and the rivers and streams are gradually returning to their pre-industrial states.

Wyoming Dam in Richmond, RI (Photo credit: Elise Torello)

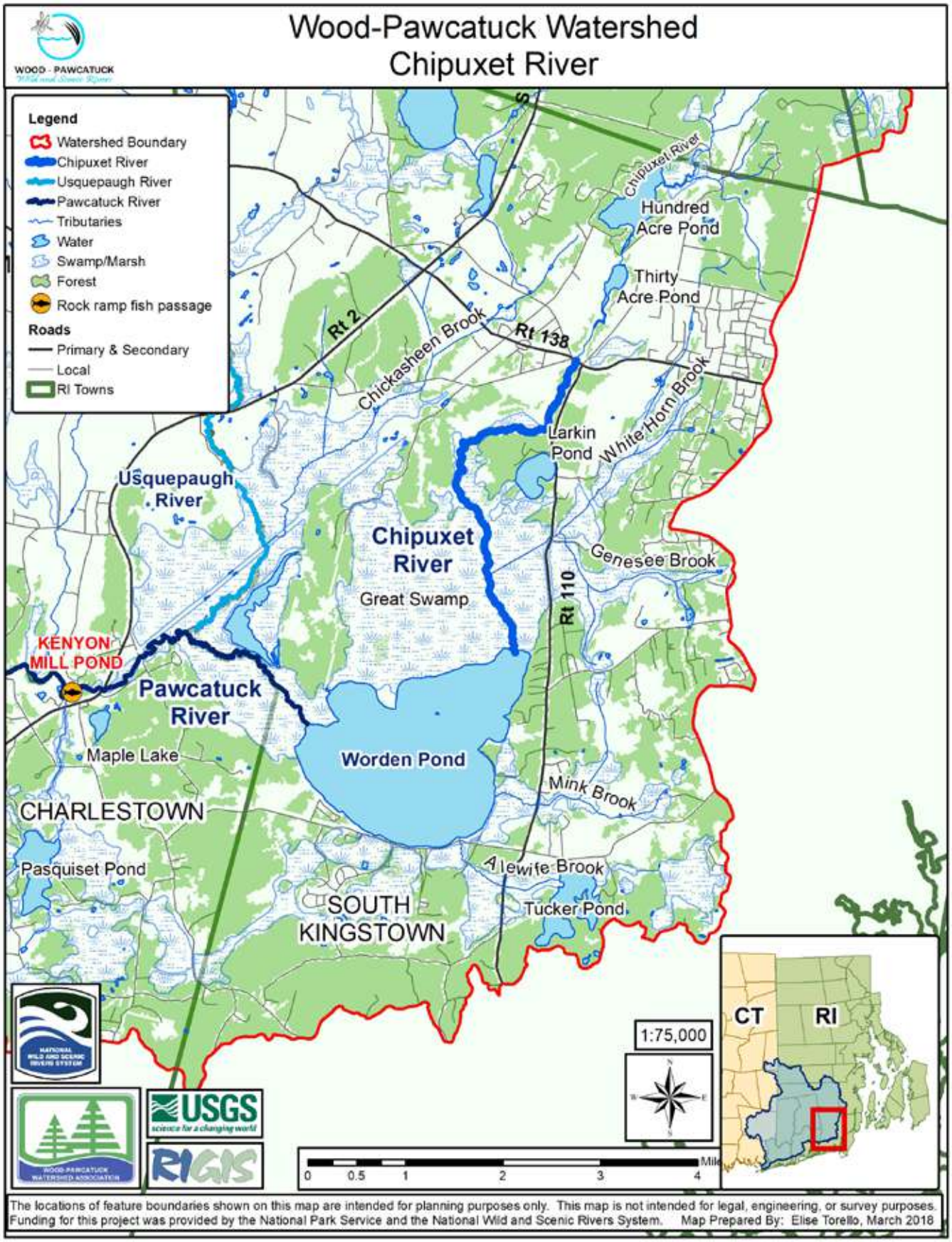


Figure 18. Chipuxet River and its sub-basin

Chipuxet River

The Chipuxet River headwaters are in North Kingstown, Rhode Island, where the river flows through agricultural fields and two ponds before reaching Route 138 in South Kingstown, Rhode Island. The segment being considered for Wild and Scenic study starts at Taylor's Landing, a popular river access point and site of a United States Geological Survey (USGS) stream gauge station. This three-mile long segment of the Chipuxet River is classified as Wild because there is no access to the river for three miles downstream of Taylor's Landing until the river empties into Worden Pond. A trip from Taylor's Landing to its outlet into Worden Pond gives the paddler a sense of what this area must have looked like before European settlement.

Along this segment, the Chipuxet River slowly meanders through the 3,350 acre RI DEM Great Swamp Management Area, where it becomes part of a larger complex of forested and scrub-shrub wetlands. With virtually no changes in gradient, the river flow is languid and slowed even more by adjacent wetland vegetation. Water quality remains high due to extensive contiguous forest buffers surrounding the river and lack of development and accessibility. However, there are threats to the Chipuxet River from multiple water withdrawal wells throughout the aquifer. Along the headwaters of the Chipuxet, there are expansive agricultural fields, primarily turf, that withdraw water either directly from the river or from retention ponds to irrigate fields. Also, this area includes public water supply wells that provide all the drinking water for the University of Rhode Island and Kingston village. Just south of Taylor's Landing are two more water withdrawal wells used for agricultural irrigation.

Outstandingly Remarkable Values

Ecology – The entire three-mile segment under consideration for Wild and Scenic designation from Taylor's Landing to Worden Pond is undeveloped. This stream is an integral component of the RI DEM Great Swamp Wildlife Management Area, which represents the largest swamp in the region. The river basin is dominated by Red Maple swamps and a few scattered Cedar swamps with a relatively high diversity of wetland plants. Because the area represents one of the region's largest contiguous forest patches, the habitat supports many aquatic dependent species of invertebrates, birds, mammals, amphibians and reptiles. The area has been designated as a National Natural Landmark.

Scenic/Recreation – The Chipuxet River slowly meanders through three miles of contiguous forest and wetlands that provide beautiful scenery for paddlers, with little evidence of human settlement. Opportunities to fish and hunt in the Great Swamp Wildlife Management Area are available, and many people use this area to hike and observe wildlife. The William C. O'Neill Bike Path crosses the Chipuxet approximately a half mile south of Route 138, giving bikers and walkers a glimpse into a wild system.

Cultural – Rich agricultural fields are found on the outwash plains to the west of the northern end of this segment. The Great Swamp Massacre, a battle between an alliance of the New England militia and Pequot tribes against the Narragansett tribe, took place near the Chipuxet in December 1675.

Chipuxet River winding through the Great Swamp, South Kingstown, RI (Photo credit: Elise Torello)

Narragansett Uses of the River

Lorén Spears, Executive Director, Tomaquag Museum

The Narragansett people used the Wood and Pawcatuck Rivers and their tributaries for variety of reasons throughout history and continue to do so today. They were historically utilized as a means of travel not only locally but around the region. Today, the Narragansett still canoe the rivers but more for recreation, harvesting and ceremony.

The rivers are used to harvest food including a wide variety of fish. Prior to industrialization and the damming of the rivers the tribal community harvested fish utilizing weirs, also known as basket traps, capturing herring, salmon and other spawning fish. They set up fishing camps along the rivers to harvest the resources in season. Along with fish, birds such as geese and ducks, amphibians like frogs, salamanders and reptiles such as turtles, eels, and snakes, were harvested. They also hunted aquatic mammals and mammals that traveled by the river's edge. These animals were used for food, clothing, blankets, capes, shoes, tools, sewing implements and much more.

The Narragansett utilized as much of the animal as possible. Today, they still utilize many parts beyond the food of animals harvested. Traditional artists use fish teeth to make their loom thread separators, turtle shells for rattles, skins and furs for clothing, and hides, reeds, and wood for musical instruments such as rattles, drums and flutes.

Along the banks they gather clay, which was used historically to create cooking pots and today for contemporary pottery as art. The Narragansett also harvest plant life around the rivers for food, medicinal herbs, and for creating items they need. Baskets, mats, sashes and other woven items are made from bulrush, cattails, and other reeds. Traditional homes, called wetu or wigwam, were covered with mats made from bulrush and cattails in the summertime; a layer of bark was added for winter homes or longhouses.

The rivers were used to transport people from their winter homes to their summer homes, as well as to other locations for trade or for visiting other villages of the Narragansett Nation or neighboring nations. The rivers provided economic, social and community vibrancy. The rivers were and are an important part of Narragansett lifeways. The rivers are a gift from the Creator. They continue to give blessings of fresh, clear water, transportation, food, medicine, recreation, and ceremony.

Snapping Turtle Basket by Robin Spears Jr.
Photo courtesy of Tomaquag Museum

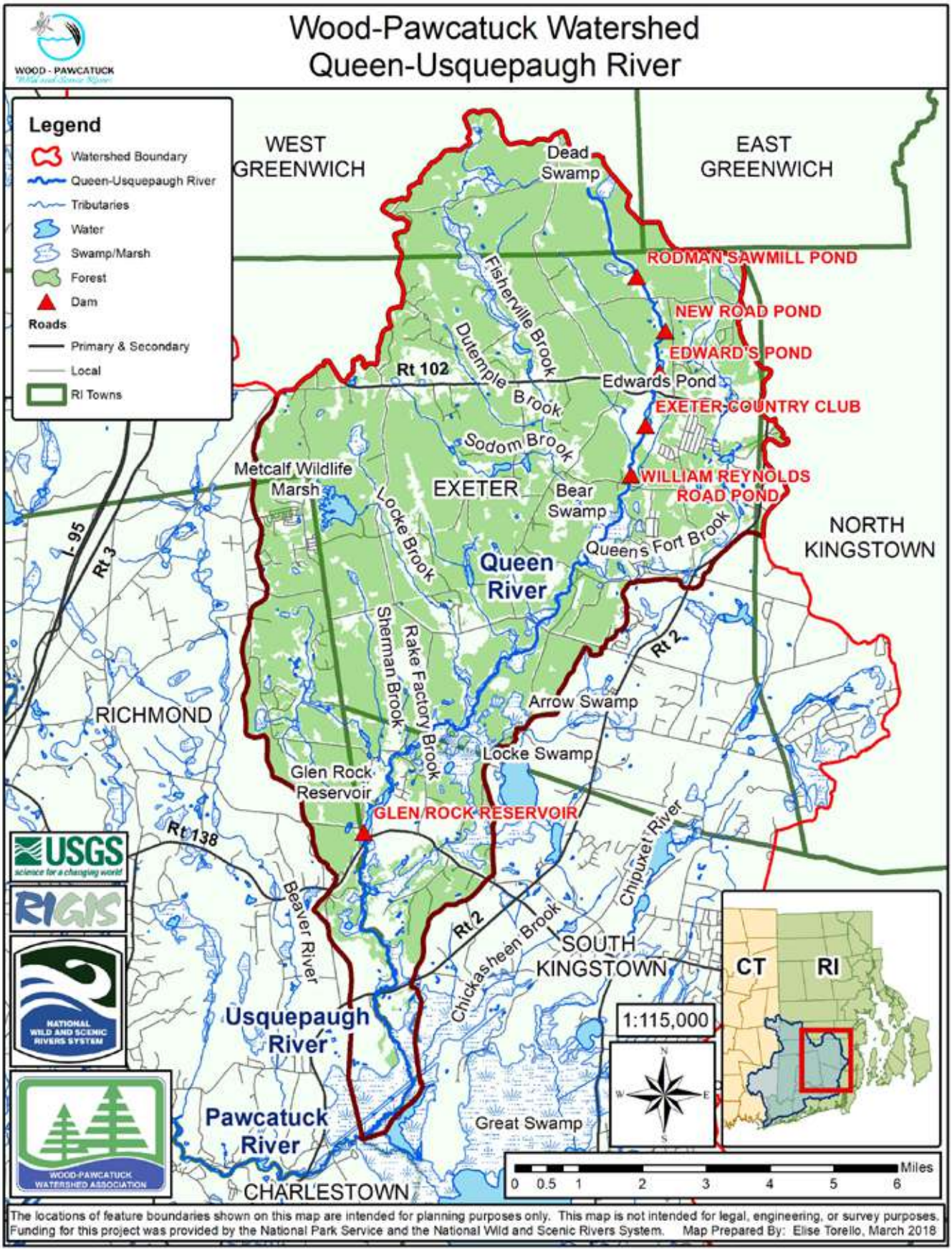


Figure 19. Queen-Usquepaugh River and its sub-basin

Queen-Usquepaugh River

Colloquially this river has been broken into two segments: the Queen River is a six-mile segment from its headwaters in Exeter and West Greenwich until the Glen Rock Dam in South Kingstown. Downstream of Glen Rock Dam is the five-mile long Usquepaugh River in South Kingstown that joins the Pawcatuck River in South Kingstown. USGS maps also use this method of naming the two segments. These rivers have exceptional habitat value due to their many clean, cold water tributaries and low (1.6%) impervious surface. The Queen-Usquepaugh River is a key component of private land protection efforts in Rhode Island, with important areas protected by TNS and ASRI. A statewide study of dragonflies and damselflies (collectively known as the order of Odonata) determined that the Queen-Usquepaugh River has the highest number of species in the state, matched only by the Wood River. The Queen-Usquepaugh River also contains the most significant populations of freshwater mussels in Rhode Island. The Queen River segment is classified as Scenic because some roads, light development, and actively farmed agricultural fields occur within a one-quarter mile buffer of the river. There is almost no development along the Usquepaugh River, with only a few agricultural fields and one road crossing. The banks are entirely wooded, providing excellent habitat for a broad array of wildlife, due in part to the high water quality. The Usquepaugh River segment is classified as Wild, primarily because much of the river is contained within RI DEM's Great Swamp Wildlife Management Area.

Outstandingly Remarkable Values

Ecology – The many first and second order streams of the Queen-Usquepaugh River provide clean, cold water throughout the year, making this superior habitat for freshwater mussels, brook trout, and amphibians. A large pitch pine forest on TNC property has several rare species of plants and animals that are endemic to

Queen River at Dugway Bridge Rd., South Kingstown, RI (Photo credit: Elise Torello)

Queen River at Kenyon Grist Mill, South Kingstown, RI (Photo credit: Elise Torello)

that habitat. The large patches of contiguous forested habitat along the Usquepaugh River provide vital habitat for area-sensitive wildlife, in part because both segments are over ninety percent undeveloped.

Of the three largest river systems in Rhode Island, only the Pawcatuck River Basin contains populations of all local mussel species. The most significant concentrations of mussels in this system are presently found in the Queen-Usquepaugh River, with seven out of the eight documented species. According to the Rhode Island Odonata Atlas (soon to be published) this river has the highest Odonata species richness (number of species) of any river in the region. It includes more riverine species than even the larger Wood River.

Geology/Hydrology – An unusual topographic feature, the Dead Swamp in West Greenwich, occurs in the headwaters of the Queen-Usquepaugh River. This unique wetland actually contributes water into two separate watersheds – the Wood-Pawcatuck Watershed and the Pawtuxet River Watershed.

Cultural – Near the village of Usquepaugh on the Queen-Usquepaugh River is a large outwash plain that contains large, actively-farmed agricultural fields. Water from the Queen-Usquepaugh River is pumped to provide irrigation of these fields. The Kenyon Grist Mill, one of the oldest operating gristmills in the region, still grinds corn along the banks of the Queen-Usquepaugh River using the original granite grinding stones quarried in Westerly, Rhode Island.

Dugway Rd. bridge on the Queen River, South Kingstown, RI (Photo credit: Elise Torello)

Importance of the Wood-Pawcatuck Watershed to Regional Conservation

Kevin Ruddock

The Wood-Pawcatuck Watershed sits primarily in the large tracts of relatively unfragmented forest found along the western border of Rhode Island. These forest blocks form a resilient and biologically significant landscape-scale ecosystem that is rare, if not unique, in the highly developed coastal region stretching from Washington D.C. to Boston.

This region has been highlighted by multiple government and non-governmental organizations. The National Park Service designated the Connecticut and Massachusetts section of this landscape as "The Last Green Valley," a National Heritage Corridor; The US Fish and Wildlife Service and the North Atlantic Conservation Cooperative's "Nature's Network" show that the area contains many significant, highly important lands, waters, and habitats; and The Nature Conservancy's (TNC) Lower New England/Northern Piedmont Ecoregional plan identifies the Pawcatuck River and its watershed as regionally important conservation targets. TNC refers to the sparsely developed landscape of Eastern Connecticut and Western Rhode Island as "The Borderlands." This area includes "matrix forests" and other critical habitats that help to provide the clean waters that make up the Wood River.

This regional significance of a relatively undeveloped area of this size is apparent when viewed in context of the "Nighttime Lights" map (below). The light associated with human development makes a reliable proxy for mapping the overall impact and disturbance of residential, commercial, and industrial development and its associated transportation networks. The Nighttime Lights map shows the location of the Wood-Pawcatuck Watershed and its relation to the relatively undeveloped forests of The Borderlands.

The states of Rhode Island and Connecticut, as well as numerous local and non-profit organizations, have long recognized the ecological value of the forests and clean rivers of the Wood-Pawcatuck system. The Rhode Island DEM's Arcadia Management Area comprises nearly 16,000 acres of forest with more than ninety miles of hiking trails and thirty miles of river shoreline. TNC purchased its first preserve in the watershed in 1972 (the Butler tract at Ell Pond in Hopkinton, RI) and has continued to work to protect land and reconnect rivers.

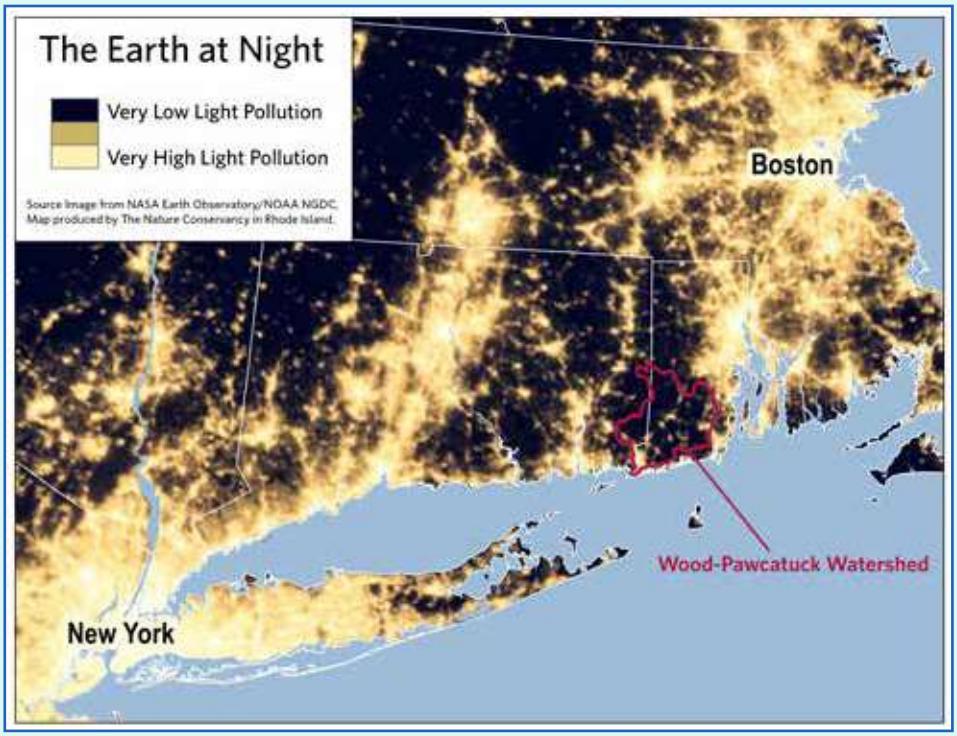


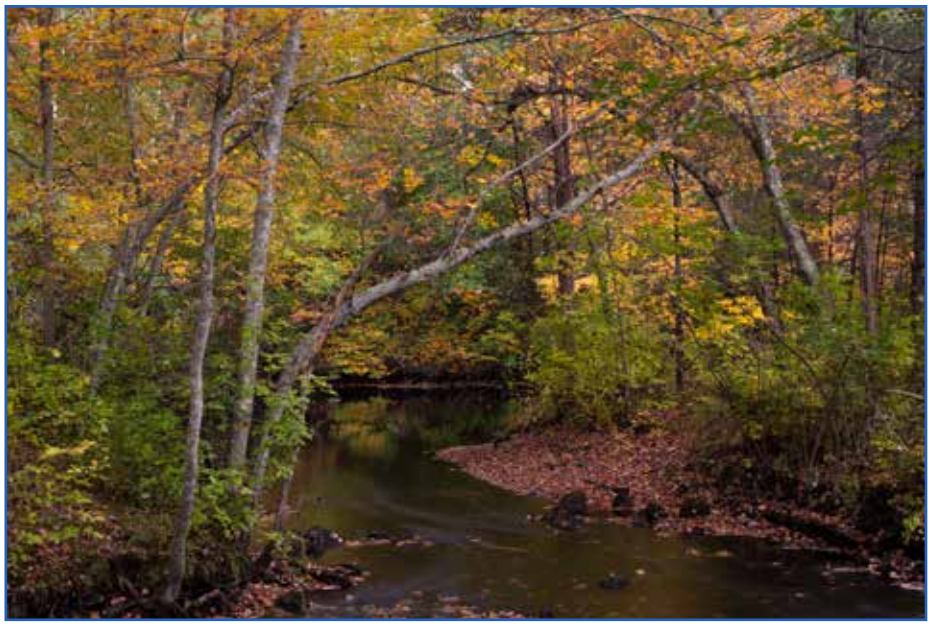
Figure 20. Wood River and its sub-basin

Wood River

The Wood River is the shining jewel of the region. From high quality ecosystems to cold water fisheries and unparalleled scenery, the Wood River is representative of all the attributes of a Wild and Scenic river.

When NPS conducted a study of rivers in eastern North America in the early 1980s, they determined that the Wood River had the highest biodiversity of any river in New England. The main stem of the Wood River has its headwater in Sterling and Voluntown, Connecticut, where the river then crosses east into West Greenwich, Rhode Island. At this point, the Wood River is known as the Falls River until its junction with the Flat River in Exeter, Rhode Island. From there it flows south forming the border between Richmond and Hopkinton, Rhode Island until it empties into the Pawcatuck River at Wood River Junction, near Charlestown. Besides the good water quality and high habitat value for abundant wildlife, the Wood River provides exceptional recreation opportunities. Fourteen miles of the twenty-four-mile long river is navigable by canoe or kayak. The scenery along this winding river is dominated by native plants and animals, including numerous migratory and resident birds, fish, and turtles. Flowers can be typically found along its banks from May until October. Its many tributaries provide cold, clean water, making it excellent habitat for trout fishing. Hunting and trapping are allowed in the three RI DEM Wildlife Management Areas adjacent to the Wood River.

The upper thirteen miles of the Wood River (Sterling, Connecticut to the Barberville Dam on Arcadia Road in Richmond and Hopkinton, Rhode Island) are classified as Wild. There are only three paved roads that cross this segment of the river, and no development is adjacent to the river until just below Frying Pan Pond. The Nature Conservancy has made land protection of this area a priority under their Pawcatuck Borderlands Project. The downstream eleven mile segment of the Wood River, from below Barberville Dam to its confluence with the Pawcatuck River, has



Upper Wood River (Photo credit: Denise Poyer)

been classified as Scenic. The river flows through a number of lightly developed mill villages and includes five run-of-the-river dams.

Outstandingly Remarkable Values

Ecology – The upper Wood River is an exceptional river ecosystem which supports the highest biodiversity of any river in New England. From the headwaters in Sterling, Connecticut to Frying Pan Pond in Richmond and Hopkinton, Rhode Island, over ninety-four percent of the land within a one-quarter-mile buffer of the river is undeveloped and primarily forested. The upper segment of the river (above Barberville Dam) runs through several thousands of acres of protected properties, including RI DEM's Arcadia and Wickaboxet State Management Areas, TNC's Tillinghast Pond Management Area, URI's Alton Jones Campus, and the Pachaug State Forest in Connecticut. It is part of the TNC Pawcatuck Borderland Project to protect large forested blocks and preserve the "dark sky" nature of the region. Local land trusts from Sterling, Exeter, West Greenwich, Hopkinton, and Richmond also own preserves near the Wood River.

While the diversity of flora and fauna of the lower Wood River is reduced compared to upper segment, the lower Wood River is still more than seventy-five percent undeveloped and contains many protected properties that support local wildlife. These include the Carolina Wildlife Management Area, Black Farm Management Area, TNC properties, and local land trust properties.

The Wood River and its tributaries contain a wide variety of wetland habitats. In addition to swamps and marshes, there are also rare and unusual habitats for this region, including white cedar swamps, black spruce bogs, fens, and vernal pools. Besides supporting healthy populations of local native reptiles and mammals, the Wood River contains several state-listed species of mussels, odonata and amphibians. Neotropical migratory birds (for example, several species of warblers, vireos, thrush, and tanagers), waterfowl, raptors, and other species of birds thrive in the large blocks of contiguous forested habitats near the Wood River. The clean cold water of the rivers provides ideal habitat for wild brook trout and the aquatic invertebrates that support them.

Scenic/Recreation – The Wood River is a destination river for paddlers throughout southern New England. It is within an hour drive from anywhere in Rhode Island and eastern Connecticut. Because of its forested banks and clean, cold water, trout can find pools of refuge even in the heat of summer, making this a vital habitat for fly fisherman. For people of all ages interested in fishing opportunities,

RI DEM stocks brown and rainbow hatchery-raised trout throughout the entire Wood River. There are also wild brook trout in all the tributaries and upper reaches of the river. One section of the river that extends from West Greenwich to Exeter, Rhode Island, is reserved for catch-and-release fishing.

Wood River Canoe/Kayak access at Switch Rd., Hopkinton, RI (Photo credit: Denise Poyer)

The same habitats that support a plethora of wildlife also offer incredible scenery and delight for outdoor enthusiasts. Canoeists and kayakers flock to the Wood River to enjoy the experience of a wild, natural river, with its many twists and turns and small class II rapids. Birders can find numerous species along the river banks. Hundreds of miles of trails can be found in the state management areas and TNC and land trusts properties. The Rhode Island North-South Trail system runs beside the Wood River and many of the tributary streams. People use the river to hunt for small game, deer, and waterfowl.

Cultural – Two Native American tribes claimed areas near the upper Wood River for winter camps. The Mohegan used the section above Bailey Pond in Sterling, Connecticut and the Narragansett used the region that started in Rhode Island. Along the Step Stone Falls are remnants of an old quarry where bedrock was easily accessible. The foundation for a timber mill using these quarried rocks can be found slightly further downstream.

A paddler in the upper Wood River (Photo credit: Denise Poyer)

Historically, as soon as people settled along the Wood River, they

Hope Valley dam on the Wood River (Photo credit: Thomas Tetzner)

constructed mills. There are seven dams along the Wood River with additional dams on the river's tributaries. These dams have a long cultural history. The early colonial settlers of the area used dams for gristmills, sawmills, tanneries, and ironworks. The numerous waterfalls and small ponds were well adapted for mill wheels. During the Industrial Revolution, from 1870 to 1940, textile mills replaced or were located beside pre-existing gristmills or sawmills. The new mills became the focus of mill villages and supported thriving communities such as those the towns of Hope Valley and Wyoming. Both the Hope Valley and Wyoming Village Historic Districts are listed in the National Register of Historic Places. Two other dams on the Wood River, the Alton and Woodville dams, supported smaller mill villages.

Geology/Hydrology – The lower Wood River has an extensive aquifer that supplies town wells for some Hopkinton and Richmond residents. In addition, the Rhode Island Water Resources Board has identified several properties along river that have the potential to be future public wells. Several of these properties have been purchased and are now in permanent protection.

Site of an early colonial quarry at Stepstone Falls, Richmond/Hopkinton, RI (Photo credit: Denise Poyer)

Opening day of fishing season at Wyoming Dam on the Wood River, Richmond/Hopkinton, RI (Photo credit: William McCusker)

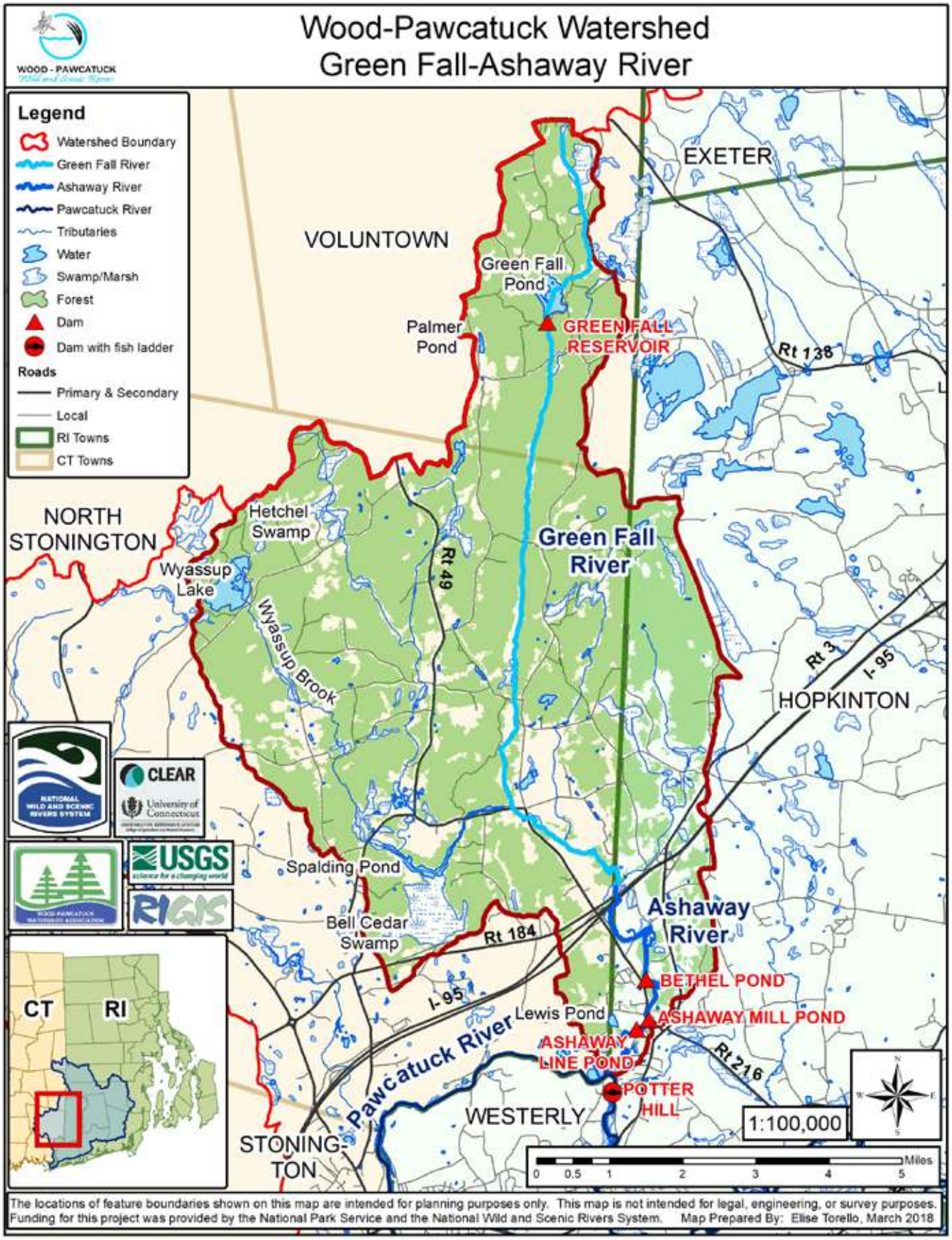


Figure 21. Green Fall-Ashaway River and its sub-basin

Green Fall-Ashaway River

The Green Fall River is a forested river corridor and an environmental treasure. The river runs from Voluntown and North Stonington, Connecticut, through Pachaug State Forest, Connecticut's largest state forest, through ravines of ancient stone ledges, small cliffs and moss-covered stone walls, fields of rich agricultural soils, and hidden quiet back roads and trails that stir the soul. The night skies can be dark here and are within New England's known coastal forest eco-system of dark skies. This entire watershed is a part of The Nature Conservancy's Pawcatuck Borderlands Project of conservation and preservation. Green Fall River joins the Ashaway River, just over the border in Hopkinton, Rhode Island, where it then serpentines four miles more to its confluence with the Pawcatuck River near Westerly, Rhode Island. A unique geological feature of the river is the Green Fall Rift Valley, renowned for its tempestuous falls and ancient rock formations and stone walls by both Native American and early settlers. The hundreds of acres of rich flood plain soils at the river's southern end continue in agriculture to this day, with five dairy farms in high production. The days of a bustling mill village life along Green Fall River are past, but mill artifacts, stone foundations, stone walls and meadows abound as do a gallant number of stone and earthen dams still in use.

For nine miles from its headwaters in Voluntown, CT to the confluence with the Ashaway River, the Green Fall river is classified as Scenic because it is 90% undeveloped. The landscape is primarily forests with some agriculture and a few houses. For the next three miles until the confluence with the Pawcatuck River the Green Fall-Ashaway River runs through a more developed landscape with several small dams and village centers, with a Recreation classification.

Spalding Pond near the confluence with Green Fall River, North Stonington, CT (Photo courtesy North Stonington Citizens Land Alliance)

Outstandingly Remarkable Values

Ecology – The Green Fall-Ashaway River is part of the newly designated U.S. Fish and Wildlife Service's Great Thicket National Wildlife Refuge. A long stretch of Green Fall River flows within the Pachaug-Ledyard block of this

six-state refuge. With the New England cottontail rabbit, New England's only native rabbit, as its poster child, the management plan hopes to return certain older forest acreage to its younger forest life as an important way to enable the return of over forty species of animals and birds to their natural habitats. Among a long list of over 35 species, these successional habitats will become the refuge for the prairie warbler, blue-winged warbler, field sparrow, American woodcock and brown thrasher. Ornithologists are excited about the bird populations that have already been drawn to several clearings completed in North Stonington. In addition to these managed habitats, significant natural communities of animals, birds, and fish are designated in Connecticut's Natural Data Base, not only all along Green Fall River, but also its rich tributaries of Pendleton Hill Brook, Wyassup Brook, and Spalding Pond.

Bell Cedar Swamp was once historically known as a place for the felling and milling of giant cedar trees. Today it is treasured as a highly significant Atlantic white cedar swamp; it is no longer timbered, but preserved in trust, with drainage into Spalding Pond, one of Green Fall River's tributaries. Much of its acreage is composed of peats, large tufts and stalks of grasses in deep muck, stagnant slow-moving water, home to tall ramrod-straight cedars, whose outer bark texture is distinctive and memorable. In addition to its exemplary cedar population, Bell Cedar Swamp supports a plethora of animal, plant, bird species, with many rare and uncommon plants, including green adder's mouth orchid, nettled chain fern, and Hessel's hairstreak butterfly.

Geology/Hydrology – The Green Fall Rift Valley is a memorable, dramatic and majestic six-mile long fault, referred to by some as "one of the most significant known fault rifts." Along and within this fault, the river flows between rocky ridge lines and embankments which slowly rise three hundred to four hundred feet on either side. They are comprised of ancient gnarled stones and boulders which look elegant in the rushing water and within a dark green em-

Green Fall bridge, North Stonington, CT (Photo credit: David R. Brierley

brace of tall evergreen forest. There is a silence and sense of being away from the world that is present here. Much of Green Fall flows through Pachaug Forest, and the state trails near sections of the river and its Green Fall Pond as well as its narrow dirt entry roads are well taken care of in this special place.

Cultural – The Green Fall Rift Valley is very special to Native Americans because there is extensive ceremonial stonework throughout this river region. It includes Manitou hassunash, and hassuneutunk, the wall and serpent effigies of the Narragansett Indians. In contrast, intermingled with the sharp and enormous boulders, are miles of green velvet moss-covered stone walls, in and out, under and over, the presently forested land.

Further south from the rift valley, nearer to what had once been the two river villages known as Laurel Glen and Clarks Falls, is the rich flood plain of Green Fall River which is presently home to five working dairy farms, with over 375 acres of corn and hay fields.

One of the farm owners, advocating for the protection of these acres for agriculture, brought together the farm owners and collectively earned for Connecticut purchase of development rights for each of the farms, ensuring that this special area will permanently remain in agriculture.

Green Fall Pond, North Stonington, CT (Photo credit: Auntie Beak)

The Green Fall River Mills

Richard Seager (Photos courtesy of the North Stonington Historical Society)

Green Fall ravine
(Photo credit: David R. Brierley)

The Green Fall River rises from a swamp south of Rockville Road (Connecticut Rt. 138) in Voluntown. The river then flows due south to Green Fall Pond. It then continues south through North Stonington and into Hopkinton, Rhode Island, where the river converges with the Parmenter Brook to form the Ashaway River. Peg Mill Brook, Palmer Pond Brook and Glade Brook are all tributaries to the Green Fall River.

Just south of Green Fall Pond, starting below the dam, the river flows through a ravine formed by steep granite walls. There were mills in this ravine. The river is crossed just south of the pond by Sand Hill/Green Fall Road. Further into the ravine the river is joined by Peg Mill Brook. This brook was dammed and used to power Peg's Mill, which was located just upriver from where the two waterways meet.

1875 photo by M. Herbert Kenyon of a wooden sluice held up on rock cairns across Green Fall River ravine, Voluntown, CT.

The river flows on into North Stonington and Laurel Glen where it is crossed by Putker Road. The river had a major influence on settlement in this area due to its use as a power source. The settlement of Laurel Glen supported mills and businesses all powered by the Green Fall River. Among them were a felt mill, a shoelace factory, a lace factory, The Ashaway Line Company, and The Laurel Glen Manufacturing Company operated by Charles Kenyon and later by Deacon Barber; there is also evidence of hemp spinning for rope making. The village included a retail store, a small church and a one-room school. The foundations of some of these enterprises and the school are still there just off Dennison Hill Road. The land in this area was first owned in the early eighteenth century by Gershon Palmer, the son of Walter Palmer who emigrated to the Stonington area in the seventeenth century.

After Laurel Glen the river continues south to Clarks Falls. It is at this point that it meets with the flow from Clark's Falls Pond, first called Birch's pond or Burch pond. This pond is formed by a dam at its eastern end that powered a grist mill erected by Joshua Birch in 1733. This mill was operated by the Birch family until it was purchased by Thomas Clark of Newport, Rhode Island in 1783. In 1864, in partnership with Peleg Tift, Alfred Clark erected a woolen mill across the road from the grist mill. A long sluiceway, parts of which still exist, ran under the road from the falls on the pond on the north side of the road to the open land beyond on the south side and on to the mill site. This was a very large mill. During the Civil War it became the Clarks Falls Company, operated by S. Briggs, and it manufactured products for the

army. It later became the Federal Felting Company.

It was during the Clark family's long occupancy that the area became known as Clark's Falls, today written as Clarks Falls. Similar to Laurel Glen, Clarks Falls had a retail store, a church and one of the fifteen one-room schools that were arrayed around North Stonington.

Water from Clark's pond flowed into the Green Fall River supplying more power to drive the town's mills. Upstream from Clark's falls pond is Spaulding pond. This somewhat larger pond is formed by a dam at its eastern end, probably the site of a mill. Spaulding pond becomes Bell Cedar Swamp on its southern side; both the swamp and two tributaries contribute water to Spaulding pond. The western tributary is the Wyassup Brook, its source Wyassup Lake located in the depression between Stuart Hill and Chapman Hill. The water level in Wyassup Lake was raised in order to provide a more even flow of water to Spaulding Pond and on to Birch Pond and the Clarks Falls mills. Wyassup Brook may have provided power to Peabody's sawmill, and also have had the Old Dam where the Holmes family operated a mill. The location of the Old Dam is not known, but there is still a stone sluiceway on the southern slope of Chapman Hill that might be what remains of Peabody's sawmill.

The second tributary feeding Spaulding pond is Pendleton Hill Brook. The source of this brook is on the southeastern slope near the top of Pendleton hill. The brook is first crossed by Pendleton Hill road, just north of where the brook powered a shingle and clapboard mill. Midway down the run of the brook it joins Hetchel Brook, which flows out of Hetchel Swamp located in the depression between Chapman Hill and Pendleton Hill. Further south of where these waterways meet, there are more stone structures on Pendleton Hill Brook. It is likely that these are other old mill sites. The earliest known use of water power in the area of Clarks Falls was in 1660. During this year Thomas Bell established an iron works in the Bell Cedar Swamp. The river that was used became known as the Red River due to pollution by the iron working process. This could only have been the Green Fall River, from the mill site on down to where it joins with Glade Brook and Parmenter Brook to become the Ashaway River, and on into the Pawcatuck River at White Rock. Some years later, in the early 1700s, Thomas Bell and Gershon Palmer ran a shingle mill in Bell Cedar swamp, possibly because of the abundance of cedar available there.

Bell Cedar swamp is not in the course of the Green Fall River but contributes to the Green Fall by flowing over a dam at the eastern end of Spaulding Pond and into Burch's Pond. At the eastern end of Burch's Pond is another dam at Clarks Falls mill. From here, after passing either over the dam or through a sluiceway to the mill, the flow passes directly into the Green Fall River. On the Green Fall just north of this junction another dam, some remains of which still exist, channeled water through a sluiceway back westward to flow into Burch's Pond. This was used to augment the water flow to a gristmill.

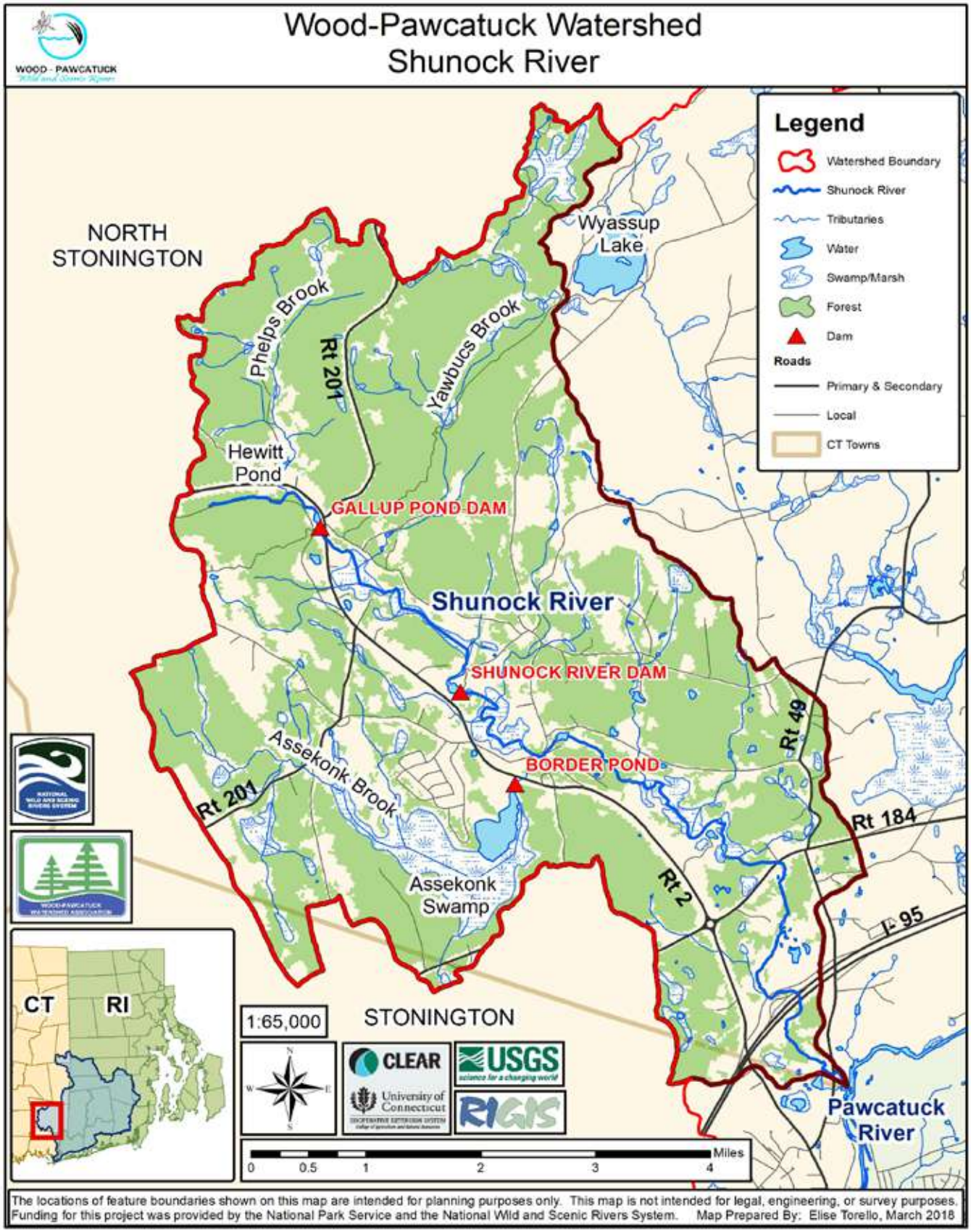


Figure 22. Shunock River and its sub-basin

Shunock River

The Shunock River flows for its entire length of eight miles within the one town of North Stonington, Connecticut. The Shunock River's past reveals some of the earliest documented use of inland water power; it was a critical resource when the town was initially developed. The river's days of being a source of energy, a constant and relied upon work horse for the community, has long been over. Today the Shunock is a narrow and winding river, resting in small fields and yards, hidden away from the hustle and bustle, while its sister, Green Fall River, runs narrow and straight, deep within its dark and stony geologic fault. Both rivers are an integral part of this rural, mostly forested town. The river enjoys recognition within The Nature Conservancy's Pawcatuck Borderlands because of its dark skies and land conservation qualities. This segment is classified as Recreation because of multiple road accesses and development along parts of the river's banks.

Outstandingly Remarkable Values

Geology/Hydrology – The Shunock runs through parts of parts of a large Connecticut aquifer before its confluence with the Pawcatuck River. Its water is cold and clear and is identified as a Level A aquifer. Two commercial wells near Lewis Pond supply water for the town's schools and other buildings, as well as certain North Stonington Village homes, and for the neighborhoods of Kingswood and Meadowood near the village.

Ecology – The Shunock is known locally as one of the town's favorite fishing holes. It is a Class 3 Wild Trout Management area noted for both its hatchery-raised and wild trout. The hatchery-raised trout are stocked in four different places along both the Shunock and Green Fall Rivers each year. There are state and federally noted natural communities of fish, wild plants, birds and animals studied and documented in the CT DEEP National Diversity Data Base; there is a richness of diversity to be found along the southern length of the Shunock from Assekonk Swamp through North Stonington Village, continuing through marshes and wetlands and free-running water to its confluence with the Pawcatuck River. Ripley

Small inlet to Shunock River (Photo courtesy of North Stonington Citizens Land Alliance)

Shunock Brook Preserve, North Stonington, CT (Photo credit: Peter Marteka)

Park Pond, right in the village, is known to be a venerated place for alewives, blue-back herring, sea-run trout, and American eel. With perseverance and foresight from many local groups much of the Shunock's embankments and land mass have been permanently preserved. Individual families, land trusts, private institutions, the state, and the town itself, have protected at least 2000 acres along the Shunock; most of them open for the use of the public. Old Haven Farm has over 500 acres of family farm and forest land protected in a conservation easement along Phelps Brook and the Shunock, with its 18th century house and its barns still in use for agriculture. The 634-acre Assekonk Swamp Fish and Wildlife Area is a glorious place for walking, hiking, fishing, and hunting and is within the village's parameters, abutting the school's playing fields. The Assekonk Brook, a major tributary, feeds directly into the Shunock in the center of the village. Assekonk Swamp is managed by CT DEEP's Wildlife Division and is renowned for its anadromous fish populations. Its aquatic habitats have been successfully managed through stocking, monitoring, and restoration programs. Extraordinary birding, hiking, and landscapes await the walker through the marshes and bogs. The Shunock runs right through North Stonington's 103-acre Hewitt Farm which the town purchased from Mystic Seaport in 2008. It, too, is near the village and has become well known as a place for horseback riding, fishing, and paddling in Lewis Pond; its 1750 farmhouse overlooks a long hay meadow and a set of community gardens. Lewis Pond is one of the

Shunock River in the village of North Stonington, CT (Photo credit: Richard Seager)

water monitoring sites tested yearly by land trust volunteers for the University of Rhode Island's Watershed Watch Program. There are testing results available for the Shunock and its tributaries as well as Green Fall River and its tributaries for well over twenty-five years, a testament to how important North Stonington residents consider the health of the town's rivers. Avalonia Conservancy's Don Henne Preserve on Babcock Road is a delightful countryside of open fields, stone walls, and woods, with the spectacular paradise of open marsh land, wetlands, and vernal pools. Across the road it has now been joined with another preserve of rocky ridges, steep and hilly, and again, North Stonington's signature stone walls.

Cultural – Native American hunting, gathering, and fishing sites are present along the Shunock and all through North Stonington. The Connecticut Office of State Archaeology has identified and documented three sites (designated 102-24, 102-25, and 102-26) within the Shunock River Corridor. The location and protection of ancient ceremonial stone works is a serious endeavor for a loyal and constant group of people within many of the neighboring towns. They have search parties, meetings, walks, and there are two known presently published books by local photographers to document these stone structures.

North Stonington's early stone walls are unique and prized. The town was named correctly; there are miles and miles of stone walls, different sizes and shapes, up and down the hilly landscape, and along its brooks and rivers. One will find stone walls in obscure places by today's land use. What were they built for, how were they used, and who built them? There are known settler walls and there are known Native American walls. Were fences for sheep, cattle, horses, or goats, or was a fence a place to put rubble from cleared land, or both? It makes no difference today, because in North Stonington stone walls are special, the *piece de resistance* in all the town. There are many early North Stonington homes along the Shunock and along its tributaries, unassuming, ageless, and in character with the very river that flows in and out of their yards with ageless energy.

Shunock River in the village of North Stonington, CT (Photo credit: Richard Seager)

The Shunock River Mills

Richard Seager (Photos courtesy of the North Stonington Historical Society)

The Shunock River flows out of Gallup Pond. Gallup Pond is fed by the Phelps Brook which runs into Hewitt Pond from the north and then on to Gallup Pond. Gallup Pond is formed by a large dam, the location of an early mill.

As the Shunock flows south it is joined by Yawbucks Brook. Continuing southeast, the River flows into Lewis Pond, also known locally as Hewitt Pond. This pond is also formed by a dam and was the site of another mill. It is likely that this was a grist mill due to its location within a large farm property. Until recently the mill turbine and headwater sluice were visible; they are now covered in concrete due to a recent bridge and dam repair resulting from the 2010 flood.

From here the river flows south toward the center of North Stonington Village. It is said that Samuel Richardson, an early settler, operated a mill on the Shunock as early as 1702. What the purpose of this mill was or where it was located is no longer known. The village was known in the 1700s as Avery's mill and then as Milltown in the 1800s. It is the site of several old mill remains. Just up river from Main Street was the upper dam, of which there are just some stone remnants today. It was built to create a mill pond, raising the water level to power the mills in the center of town. There was a sluiceway canal from this pond along the north side of Main Street and under Wyassup road, providing some of the power for the Park mill and others.

The left picture shows part of the outrace; the right picture shows the dam structure.

The Main channel of the river passes under Main Street and joins with the Assekonk Brook and then passes under Main Street again and into a deep cut in the land. Towards the eastern end of this cut is the lower dam, which formed a mill pond that powered mills located there. Both the dam and the pond are still there; a mill race and turbine can still be seen.

North Stonington enjoyed a period of prosperity as a mill town, thanks to abundant water power supplied not only by the Shunock River but also by the Assekonk Brook, critical contributor of water power to the village. The Assekonk draws its water from the south slope of Wintechog hill and from the Assekonk Swamp.

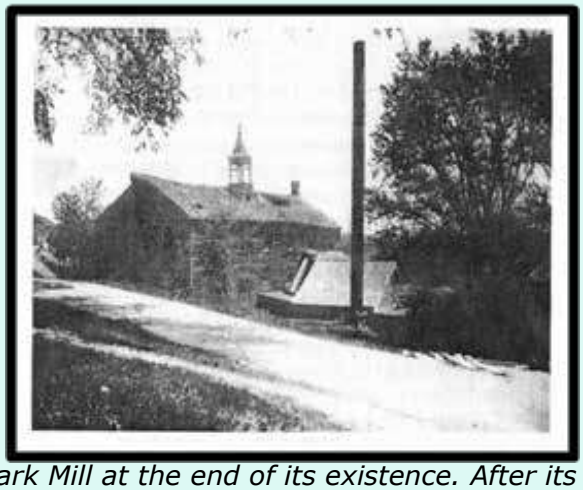
North Stonington Village supported a variety of mill operations and related local businesses from the late 1600s through early 1900s. Within the village there were numerous mills for various purposes. One of the earliest mills in the village was operated by the Avery family starting in the early 1700s. This was probably a grist mill. The village was called Avery's mills during this early period. In the nineteenth century when the village was called Milltown there

was a wide variety of mills operated in the village. The grinding of corn, the operation of saw mills, iron works, trip hammers, and nail manufacturing all took place in the village; there were also more sophisticated cotton and fulling mills.

While mill operations in North Stonington spanned three centuries, the early and mid-1800s saw the most intense industrial activity in the area. Woolen mills that carded wool for household spinning joined early gristmill and sawmill operations. These mills, in turn, helped foster the growth of John Wheeler's blacksmith business, Wheeler Hake's shoemaking enterprise, and Joseph Frink's carpenter shop. The town became a prosperous mercantile center that also included dye houses, grocery stores, and dry goods stores.

After flowing through the village the river continues generally to the southeast without additional mill sites until it passes under today's route 184, the old King's Highway that runs from Providence to New London. Downstream from where it today passes under the highway, the river provided power for the Vincent Sash and Blind factory from 1842 until the late 1880s. It is clear that the power supplied by the Shunock River along with the its tributaries, the Assekonk Brook, the Phelps Brook and Yawbucks Brook, was central to the development of the village of North Stonington.

A sawmill in about 1900 which was located near the lower dam. This mill was operated by the Park family from the late 1800s to the early 1900s.



Park Mill at the end of its existence. After its collapse the Park Hotel was built on its site.

An 1866 map showing the village with some of the mills indicated. The depiction of the river is inaccurate--it does not illustrate the mill ponds formed by the upper and lower dams.

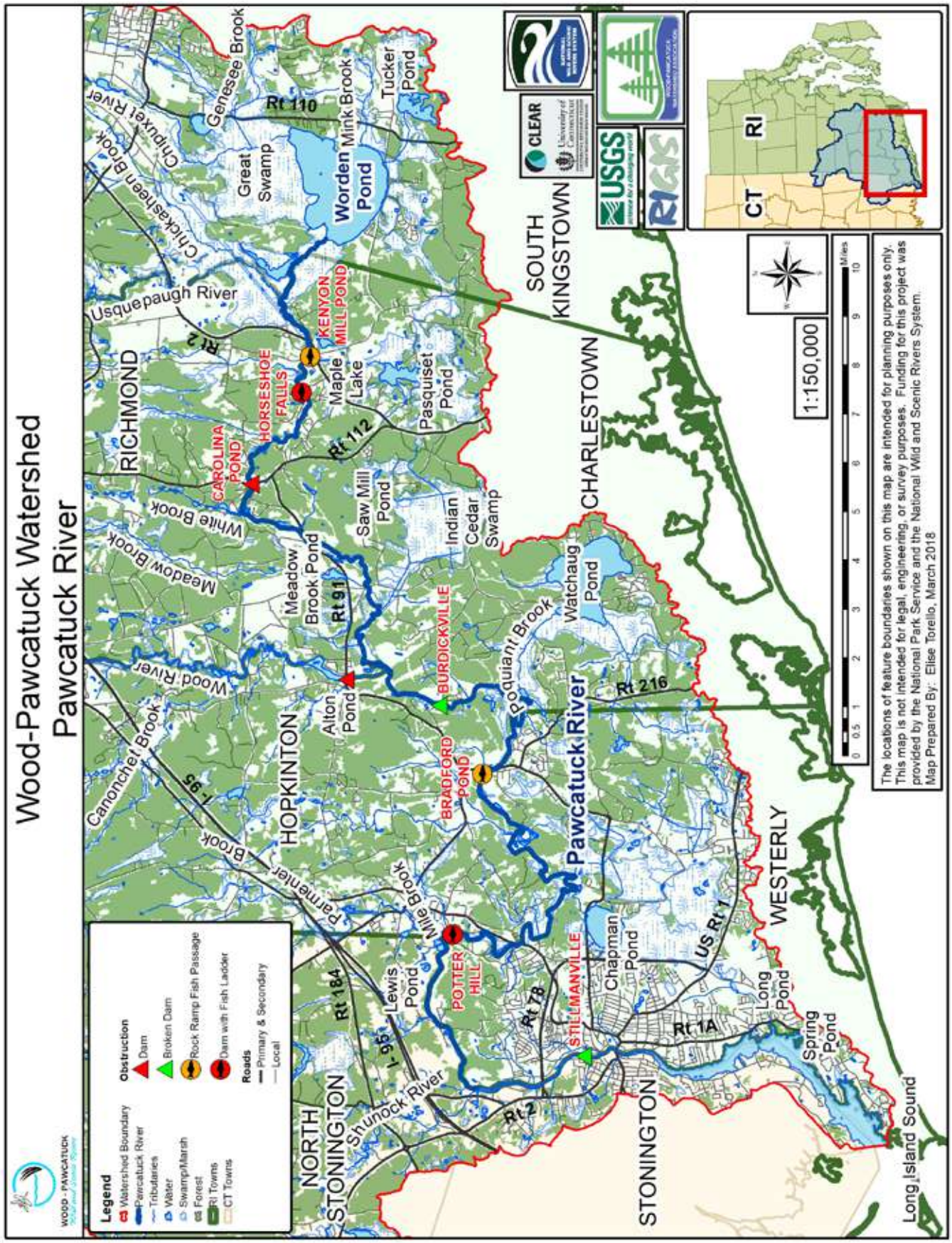


Figure 23. Pawcatuck River and the confluences with the six major tributaries

Pawcatuck River

The Charlestown Moraine altered the flow patterns of the Pawcatuck River more than 16,000 years ago. The river was forced into three compass directions due to glaciation. The river's headwaters initiate at the outlet from Worden Pond, South Kingstown (locally known as the Charles River until the confluence with the Queen-Usqeupaugh), where it flows generally from east to west for thirty-six miles to its mouth at Little Narragansett Bay. Along its course the Pawcatuck flows through, or borders, Charlestown, Richmond, Hopkinton, and Westerly in Rhode Island, and North Stonington and Stonington in Connecticut. As it nears Westerly, the river meanders from north to south before reaching the ocean. There were numerous historical dams along the Pawcatuck River; therefore conservationists over the past decade have made concerted efforts to restore fish passage. There have been two complete dam removals, one fish ladder installation, and two nature-like fish passage structures (also known as rock ramps) completed since 2010. As a result, herring have been able to spawn in Worden Pond for the first time in over 200 years.

Because the river is long and flows through several different land uses, it has been broken up into four segments for proposed classification purposes.

Headwaters Pawcatuck River: This three mile segment, from Worden Pond to the Rt. 2 Bridge in South Kingstown, has been classified as Wild. It is primarily part of the Great Swamp wetland complex that includes the Chipuxet River, Worden Pond, and the Queen-Usquepaugh River. There is no road access throughout this segment.

Upper Pawcatuck River: From the Rt. 2 Bridge to the Rt. 112 Bridge in Richmond, the river flows for about four miles through several old mill villages and an operating manufacturing building. This stretch has been classified as Recreation due to the road access and light to medium development along its banks.

Worden Pond, South Kingstown, RI (Photo credit: Denise Poyer)

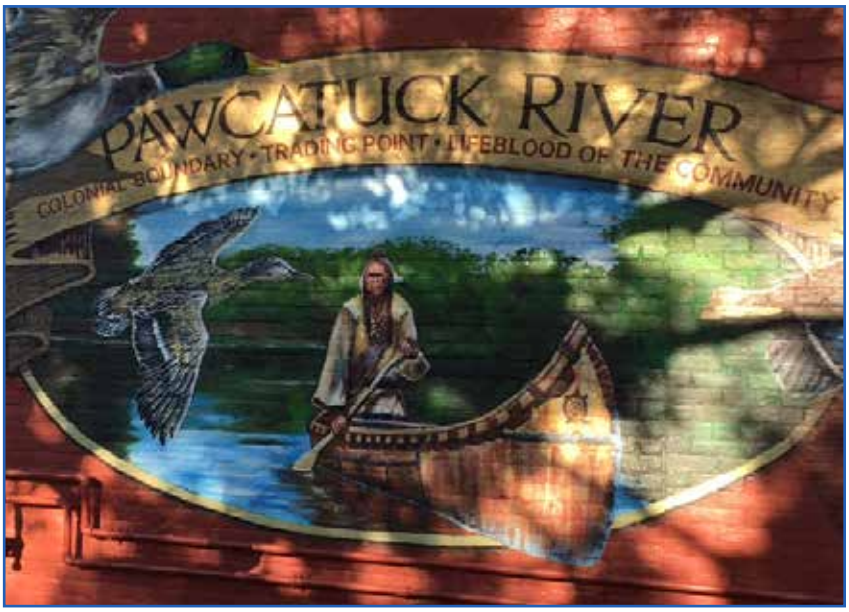
Middle Pawcatuck River: From the Rt. 112 Bridge and the old Carolina Mill, the river flows for twenty-one miles through heavily forested areas until the confluence with the Shunock River in Westerly, Rhode Island and Stonington, Connecticut. Here it forms part of the border between the two states. This section is classified as Scenic because of minimal road access and some light development.

Lower Pawcatuck River: From the Shunock River confluence the river flows through increasingly urbanized banks for eight miles to the Little Narragansett Bay. In this segment it becomes a vibrant part of two towns, providing recreation and scenic values. At the Rt. 1 Bridge the water becomes brackish as the river becomes the Pawcatuck Estuary. This segment has been classified as Recreation because of the moderate to heavy development along the banks.

Outstandingly Remarkable Values

Geology/Hydrology – This unique river was created by the action of the glaciers receding about 20,000 years ago. As the glacier slowly melted back from its furthest point near Block Island, the climate changed enough that it stalled along what is now the south coast of Rhode Island. For several thousand years the glacier kept moving sand and boulders down, depositing them in a recessional moraine. The Charlestown Moraine can be seen just north of Rt. 1 in South Kingstown, Charlestown, and Westerly, Rhode Island. The moraine forced the normally southerly flowing rivers to find an outlet toward the west, eventually heading south between Westerly and Stonington, Connecticut.

Ecology – The presence of the moraine created extensive wetlands just to its north, including the Great Swamp, Indian Cedar Swamp, Phantom Bog, and Chapman Swamp. The Great Swamp is the largest swamp in New England. It supports large areas of swamp, forest and marsh vegetation. Bordered on the east and west by the Chipuxet and Usquepaugh Rivers, this expansive wetland provides unparalleled



Mural depicting the Pawcatuck River in downtown Westerly, RI (Photo credit: Dan Hyland)

habitat for a vast biodiversity of plants and animals. It is the wildest part of Rhode Island. This area is a National Natural Landmark.

The Pawcatuck River is home to sixty-seven species of fish, more than any other watershed in Rhode Island. The WPWA and TNC have successfully reconnected anadromous fish, such as herring and alewives, to their historic spawning grounds at Worden Pond. American eels, a federal species of concern, are abundant throughout the river corridor. They inhabit the many streams and rivers that feed the Pawcatuck. In 2018, Bradford Dam was replaced by a nature-like fishway, which is a series of boulder weirs spanning the width of the river allowing fish to incrementally make their way up stream. The remaining two dams, Horseshoe Dam in Richmond/Charlestown and Potter Hill Mill Dam in Westerly, now have fish ladders.

Cultural – Several important Native American archeological sites are found near the Pawcatuck River. A monument to the Great Swamp Massacre of Narragansett Indians by colonists in the seventeenth century can be found in the Great Swamp Management Area. An historic battle between the Narragansetts and the Pequots was fought at the Lower Shannock Falls.

Fish Passage in the Wood-Pawcatuck Watershed

Christopher Fox

Our rivers once meandered through the watershed uninhibited by human influence, carving new curves as the centuries passed. In the eighteenth century, European settlers began to harness the power of the Wood and Pawcatuck Rivers to support the growing economy by both straightening and damming the rivers. How much consideration they gave to the impact their actions would have on the resident and migratory fish that depend on the free flowing rivers has been lost to history.

As the centuries passed, the impact became clear and could be most easily seen by the decline in the annual return of salt water fish that require calm freshwater ponds to reproduce. This fish depletion was not unique to the watershed, occurring all around North America. By the mid-twentieth century the concern for the decline became great enough that fish ladders began to be installed on the dams of the lower Pawcatuck River. These concrete structures helped fish find their way around the dams that were too tall for the fish to get over. Many fish were unable to make it up the ladders, but enough did, marking the beginning of fish passage restoration on the Pawcatuck River.

This first burst of restoration provided passage at the Potter Hill and Bradford Dams in Westerly and Hopkinton, Rhode Island, restoring fish access to spawning grounds at Watchaug Pond in Charlestown, Rhode Island. The upper Pawcatuck River remained inaccessible to migratory fish, and the habitat for the resident freshwater fish was segmented. This deficiency was addressed in the report titled Pawcatuck River Estuary and Little Narragansett Bay: An Interstate Management Plan adopted July 14, 1992 by the Rhode Island Coastal Resources Management Council and the Connecticut Department of Energy and Environmental Protection. The report pointed to the restoration of river continuity as a high priority toward restoring fish passage throughout the entire Pawcatuck River.

In the twenty-first century, after careful planning and fundraising, work began to remove the remaining impassable barriers located in Richmond and

Charlestown, Rhode Island. With the removal of Lower Shannock Falls Dam (done in 2011), a fish ladder and eel-way added to Horseshoe Falls Dam (2012) and the redevelopment of the Kenyon Dam into a nature-like fishway (2013), resident and migratory fish were now able to move throughout the Pawcatuck River system. Successfully providing access between the pristine spawning grounds of Worden Pond in South Kingstown, Rhode Island and the Atlantic Ocean in Westerly, Rhode Island and Stonington, Connecticut was truly an historic achievement.

Fish and eel passage at Horseshoe Falls on the Pawcatuck River, Charlestown, RI (Photo credit: Denise Poyer)

These efforts were so successful, from a restoration and community impact perspective, that further work to improve fish passage efficiency on the lower Pawcatuck River was later undertaken. The White Rock Dam in Westerly and Stonington was removed in 2016 and the Bradford Dam has been redeveloped into a nature-like fishway, just completed in 2018. The effort to remove or upgrade the aging fish ladder at Potter Hill is also on the horizon.

The Wood River, a main tributary of the Pawcatuck River, has received no attention with regard to river or fish passage restoration at its five dams. This river has no natural ponds that could serve as prime spawning grounds for migratory fish, making it a low priority for restoration. However, river connectivity is equally important to the freshwater fish and other wildlife that call the Wood River home. Perhaps in the coming decade greater emphasis on the needs of these species will lead to further restoration efforts.

The work outlined above could not have been accomplished without the many partnerships between entities like the Wood Pawcatuck Watershed Association, The Nature Conservancy, Rhode Island Department of Environmental Management, Connecticut Department of Energy and Environmental Protection, Rhode Island Coastal Resources Management Council, United States Fish and Wildlife Service, National Oceanic and Atmospheric Administration, the United States Natural Resource Conservation Service, Federal Emergency Management Agency, the United States Geological Survey, and many towns, communities, private landowners, engineering and construction firms.

Nature-like fish passage in the Pawcatuck River at Kenyon Industries, Charlestown/Richmond, RI (Photo credit: Elise Torello)

Pawcatuck River at Kenyon Industries, Charlestown/Richmond, RI (Photo credit: Denise Poyer)

While there is only one productive mill along the river, remnants of nine historic mills, dams, and villages can be found throughout the river course starting at Kenyon Industries in the village of Kenyon, which straddles the Richmond-Charlestown border. The Pawcatuck River also passes through the villages of Shannock, Carolina, Burdickville, Alton, Bradford, Ashaway, and White Rock. The Pawcatuck estuary had an active shipbuilding industry for over 200 years, from 1681 to 1889. The estuary provided transportation to move coal and other goods into and out of Westerly, including the famous Westerly granite used in many well known statues and buildings throughout the east coast.

The NPS has designated the area adjacent to the Pawcatuck River on Mechanic Street as the Mechanic Street Historic District for inclusion in the National Registry of Historic Places. The Rhode Island Royal Charter of 1663 documented English royal recognition to the colony of Rhode Island and Providence Plantations and identified the Pawcatuck Estuary as the westward boundary. The Westerly – Pawcatuck Route 1 Bridge spanning the Pawcatuck River was originally built in 1712.

Rt. 1 bridge over the Pawcatuck River, Westerly, RI/Pawcatuck, CT (Photo credit: Dan Hyland)

Scenic/Recreation – Today the Pawcatuck River is well known for recreation. All of its thirty-six miles are

Kayakers in the Pawcatuck River (Photo credit: Denise Poyer)

navigable by small craft under most water levels. Starting at the mouth of the river, there are several marinas, a public boat launch, parks and nature preserves. Motorized boats are found primarily in the estuary including two short upstream stretches which are deep enough to accommodate them. Otherwise the Pawcatuck River is primarily enjoyed by canoeists, kayakers, and stand up paddlers. There are five state management areas in Rhode Island and Connecticut, along with numerous conservation lands owned by TNC, ASRI, and local land trusts. These properties are prime spots for hiking, biking, birding, and wildlife viewing. There are two riverfront campsites on the Pawcatuck River, the Burlingame and Carolina Management Areas. Nine fishing and boating access points dot the river from Biscuit City Landing to the Westerly Town Dock.

Rt. 1 bridge over the Pawcatuck River, Westerly, RI/Pawcatuck, CT (Photo credit: Dan Hyland)

Ships Built on the Pawcatuck River

Dwight C. Brown, Jr.

More than 240 ships are known to have been built along the Pawcatuck River. One of them, the whaleship *Charles Phelps*, launched in 1842, made special contributions to the history of Pawcatuck River built vessels. She served in the Stonington whaling fleet until a decline in the industry just prior to the Civil War. During the Civil War, the *Phelps* was sold to the United States government to be used as part of the so-called Stone Fleet. The Navy found her in such good condition that they kept her for use as a store ship. She spent the war years in the southern ports around Norfolk, Virginia.

While on this duty, official Navy records indicate that she was capable of freighting 342 tons of coal in one voyage and that some of her freight included parts for an Ericsonn cannon. The only Ericsonn cannon in use with the navy at that time were on the USS *Monitor*, famous for its battle with the *Merrimack*.

The New York Herald listing of U. S. Navy ships listed the *Charles Phelps* as being armed with one cannon. Her crew was also noted in Navy records as being comprised of more than seventy percent African-Americans.

After the Civil War, the *Phelps* was sold to New Bedford parties, who outfitted her as a whaler and renamed her *Progress*. As the *Progress*, she was in the New Bedford whaling fleet until the mid-1880s, when she was idled along with many others of the American whaling fleet. In 1893 she was chosen to represent the United States whaling fleet at the Chicago World's Fair. After the Fair closed, the *Progress*, which was by then in a neglected condition, was, according to one report, burned to the water line in the Chicago River, thus ending a long and historical life as a whale ship and Civil War store ship.

Jane, a sloop rigged sailing vessel later converted to a schooner rigged vessel, was built in 1832 in the Main Street Amos Cross Shipyard, Westerly, Rhode Island, located on the Pawcatuck River. The *Jane* sailed between the ports of New Bedford, Hartford, New York and Albany, but mostly between Westerly and Providence, Rhode Island. This vessel called Westerly her home port for many years. Her freight consisted of thousands of tons of coal for the industries along the Pawcatuck River, all kinds of fish for the city markets, and cotton goods shipped to and from Westerly for many of the ports on her voyages. For the first six years of the *Jane*'s career, her captain was a correspondent for the Providence Journal, collecting any and all news items in Westerly for publication.

The *Jane* was part of a trade that was capable of transporting all types of freight and passengers along the coastal trade routes in the northeastern ports of call. When the schooner *Jane* was more than sixty years old, she was found abandoned in Boston harbor. Whether she survived much longer is unknown at this time.

Marinas on the lower Pawcatuck River (Photo credit: Dan Hyland)

Water Quality in the Wood-Pawcatuck Watershed

Arthur J. Gold, D. Q. Kellogg, Margaret Kerr

Among the large river systems within the Narragansett Bay basin the Wood-Pawcatuck Watershed encompasses waters of the highest quality (Figure 24).

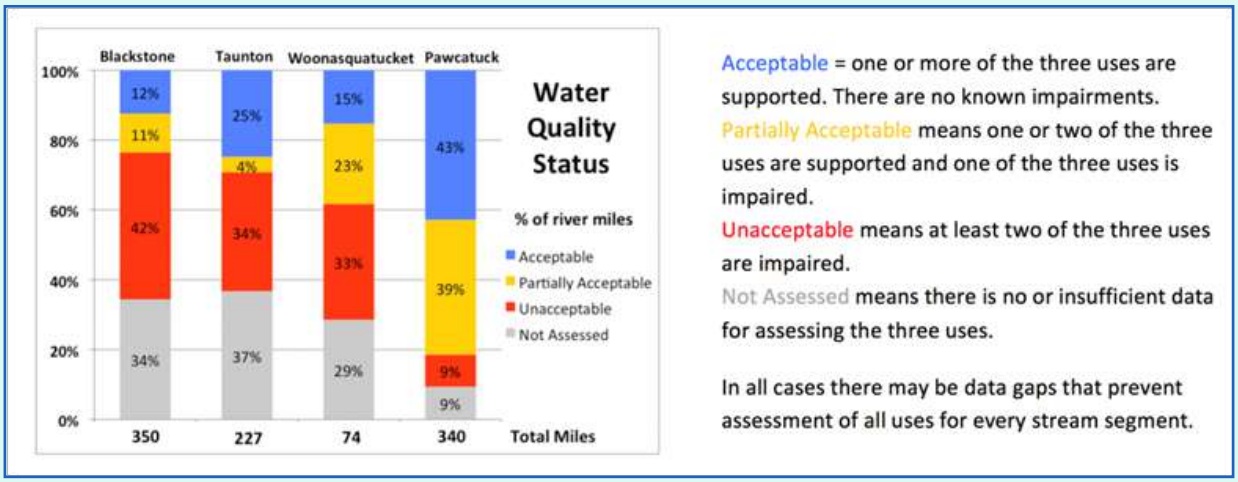


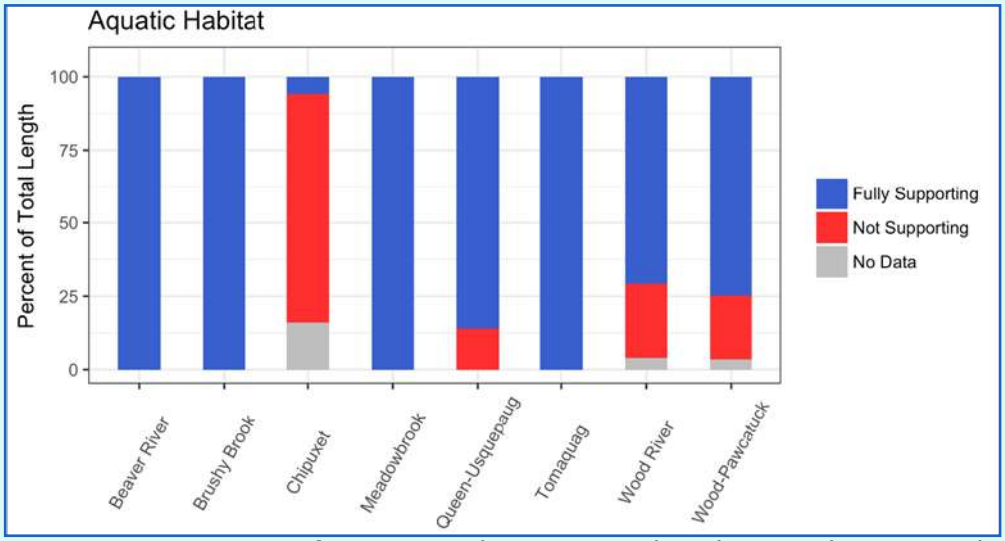
Figure 24. Water quality status of four of the largest river systems within the Narragansett Bay basin, based on the 2010 assessment (RI DEM, 2010). Figure from Watershed Counts (2012).

We examined water quality within the Wood-Pawcatuck Watershed and its major sub-basins (Figure 2) from two perspectives: the degree to which aquatic life is supported, and the extent of impervious cover.

Aquatic Habitat

Based on the 2016 assessment of water quality within the watershed, close to 75% of assessed miles fully support aquatic habitat, defined as "waters suitable for the protection, maintenance, and propagation of a viable community of aquatic life and wildlife" (RI DEM, 2018). Factors considered when assessing river reaches include (RI DEM, 2018):

- Biological (macroinvertebrate) data including physical habitat information
- Conventional parameters, e.g., dissolved oxygen, nutrients and pathogens
- Toxic parameters in water column
- Toxicity data
- Minimum water quality general criteria and aesthetics



Most of the major sub-basins meet criteria to fully support aquatic life along at least 75% of assessed miles, with the Chipuxet being the exception (Figure 25). The reasons for impairment within the Chipuxet include the presence of non-native aquatic plants in one reach and the presence of iron in a second reach (RI DEM, 2016).

Figure 25. Status of Aquatic Habitat Use within the Wood-Pawcatuck Watershed and major sub-basins. Based on data from RI 2016 assessment (RI DEM, 2016).

Impervious Cover: Impervious cover (IC) has long been associated with water quality impairments and has proved to be a useful watershed management metric. IC increases surface runoff during storm events, carrying a wide range of pollutants—sediments, nutrients, pathogens, pesticides, and other chemicals associated with transportation systems—to receiving waters (RI DEM, 2012; CWP, 2003). Commonly accepted thresholds are used to evaluate the expected water quality status within a watershed.

Impervious Cover Range	Water Quality Status
0 to 10%	Protected
10 to 25%	Impacted
> 25%	Degraded

One study found brook trout were most likely to be found in streams where the watershed IC was less than 4% (Stranko et al., 2008).

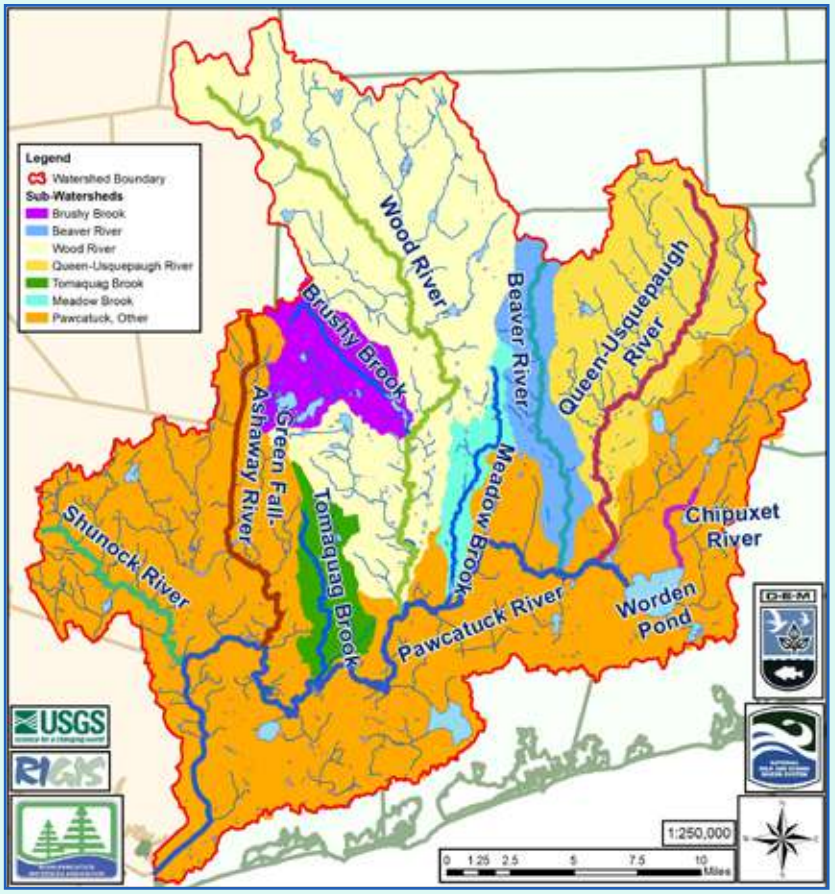


Figure 26. Major sub-basins in the Wood-Pawcatuck Watershed that are discussed in this section. These may vary somewhat from others with similar names because of the chosen outlet point.

All of the major sub-basins as well as the Wood-Pawcatuck as a whole fall well below the 10% IC threshold deemed "Protected", while all except one (Chipuxet) fall below the 4% threshold deemed as most favorable for brook trout (Figure 27).

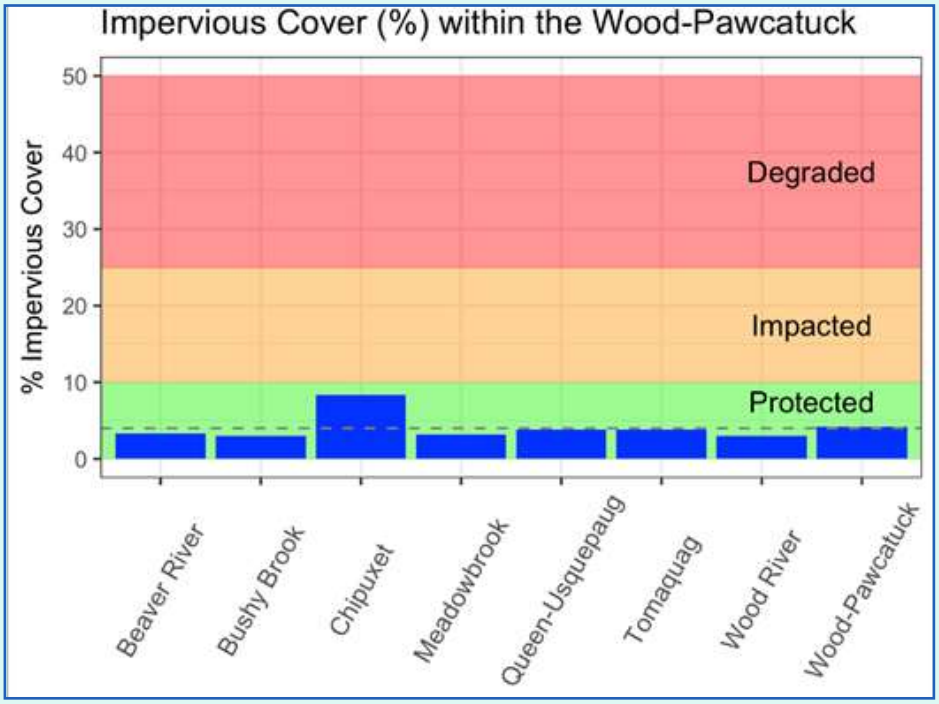


Figure 27. Impervious cover (%) within the Wood-Pawcatuck and its major sub-basins. Note that all fall below the 10% IC threshold to be deemed "Protected" while all except one (Chipuxet) fall below 4% IC (gray dotted line), the threshold below which brook trout are most commonly found.

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Beaver dam in the Pawcatuck River (Photo credit: Elise Torello)

Painting of the Wood River by Susan Shaw

CHAPTER 4: WINNING STRATEGIES FOR THE WOOD-PAWCATUCK WATERSHED

An important aspect of the Partnership Wild and Scenic Rivers Program is to verify that there are already adequate measures in place to protect the Outstandingly Remarkable Values (ORVs) of the rivers. The Study Committee elected to engage a consultant to review the current local, state, and federal protections as they pertain to the Beaver, Chipuxet, Green Fall-Ashaway, Queen-Usquepaugh, Pawcatuck, Shunock, and Wood Rivers in CT and RI. They selected Mason and Associates because they had experience working with several of the towns to update their Town Comprehensive Plan or Plan of Conservation and Development. Based on this report the Study Committee determined that there do exist good measures to adequately protect the rivers' ORVs.

Excerpts from the Mason and Associate's report are below. The full report is included as Appendix A.

Summary of Federal, State, Municipal and Tribal Laws, Regulations, Ordinances and Plans for the Wood-Pawcatuck Wild and Scenic Rivers Study

Introduction

This report summarizes plans and regulations for twelve towns in the Wood-Pawcatuck Wild and Scenic Rivers Study area. As part of that study, the Wood-Pawcatuck Wild and Scenic Rivers Study Committee is preparing "…a locally-based Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and a Study Report that describes the eligibility and suitability of a Partnership Wild and Scenic River designation for the Beaver, Chipuxet, Green Falls, Queen-Usquepaugh, Pawcatuck, Shunock, and Wood Rivers." (WPWSRSC, 2018). The Stewardship Plan will help to protect the Outstandingly Remarkable Values (ORVs) documented in the Study. The National Park Service (NPS) 2013 report "Wild and Scenic River Reconnaissance Survey of the Wood-Pawcatuck Watershed" states (p.20):

> *An in-depth analysis is undertaken during a Wild and Scenic Study and includes an evaluation of:*
> - *The adequacy of local zoning and other land use controls in protecting the Wild and Scenic River value by preventing incompatible development. …*
> - *The state/local government's ability to manage and protect the Wild and Scenic River values on non-federal lands. In conducting this evaluation a study team will determine if the communities and state have existing zoning and land use controls adequate to protect the waterways and associated ORVs, or whether additional controls are necessary to protect resources. Essential programs or regulations, together with resource objectives and recommendations for future action, are documented in the comprehensive river management plan (CRMP) developed as a part of the Study. Partnership Wild and Scenic River (PWSR) designation under the WSRA is only suitable when there is strong, broad-based support for these critical elements as included in the Plan. (NPS, 2013)*

Federal and state laws provide significant protection to the rivers and provide a foundation for local protections as well; key federal and state laws are therefore described in this report. For each of the twelve member communities, this report provides a summary of community plans and municipal ordinances that relate to the use, protection, and/or management of the study rivers, and identifies potential areas for improvement.

3.0 Federal, State and Tribal Protection

Regulatory protection of rivers and watersheds is based on state, tribal, and in some cases federal plans, policies and laws. This section describes key regulations at the federal, state and tribal level that protect study rivers and associated Wood-Pawcatuck Watershed ORVs. In some cases the regulations described below provide direct protection without significant local responsibility for implementation; in many cases the regulations delegate implementation to the municipal government (the National Flood Insurance Program, for example). In many instances the regulatory protections afforded to a particular resource involve multiple jurisdictions and authorities. This section begins with a brief listing of some of the more important federal laws, followed by descriptions of the protections afforded by the Narragansett Indian Tribe, the State of Rhode Island and the State of Connecticut. (See Appendix A for complete listing)

3.1 Federal

Besides the Wild and Scenic Rivers Act there are several federal protections already in place. These include:

- National Environmental Policy Act (NEPA) requires that all federal agencies consider the environmental impacts of their actions. Each federal agency has implementing regulations that are followed to ensure NEPA compliance.
- Historic Preservation Act – Section 106 of the federal Historic Preservation Act requires that federal agencies consider the impacts of their actions on historical and archaeological resources. Whether officially designated or not, properties that are eligible for listing on the National Register of Historic Places are protected.
- The National Flood Insurance Program provides federally subsidized flood insurance to homeowners and businesses. To be eligible to participate in the program, a local government (municipality) must enact laws that restrict development in flood hazard areas.
- The federal Clean Water Act (CWA) regulates many activities affecting the study rivers. It sets goals that waters of the United States should fishable and swimmable and generally suitable for public water supply. The most important CWA protections involve regulation of point source discharges of wastewater (municipal sewage, industrial pollutants, stormwater outfalls), non-point sources of pollution such as stormwater runoff from farms and urban areas, and the destruction of wetlands by filling.

- The federal Safe Drinking Water Act (42 U.S.C. 300f, 300h-3(e), Pub. L. 93-523) is intended to ensure safe potable water is available to the public. It sets specific water quality criteria and standards, and empowers EPA to administer implementing regulations. In 1988 the EPA designated the groundwater of the entire Pawcatuck Basin Aquifer System (entire Wood-Pawcatuck Watershed) as a "Sole Source Aquifer" because of its importance as the only source of drinking water available to the public (53 FR 17108).
- CERCLA, RCRA, FIFRA, and TSCA - Environmental pollution from toxic chemicals lead to a number of federal laws in the 1970s and 1980s that regulate the use and disposal of toxic or otherwise hazardous chemicals. While the CWA focused largely on wastewater discharges to waterways, these other regulations focused on a) the use of chemicals in the workplace, home and environment, and b) the ultimate disposal of waste chemicals in the environment.
- The Endangered Species Act authorizes USFWS and NMFS to identify endangered and threatened species, and species of concern, and implement regulations to protect those species.

3.2 Narragansett Indian Tribe

The Narragansett Indian Tribe (NIT) is a sovereign nation with federally recognized tribal lands adjacent to the Pawcatuck River and extending southward to Route 1. These tribal lands include important water resources such as Indian Cedar Swamp and Schoolhouse Pond, and are known to support a number of different rare species and habitats. The NIT tribal land overlies one of the largest groundwater reservoirs (high yield aquifers) in the region. While the designated tribal lands are certainly rich in cultural resources associated with the Narragansett Indian Tribe and their ancestors, such resources are extensive throughout the Wood-Pawcatuck Watershed. Resource protection is provided by the NIT's Department of Community Planning and Natural Resources, and the Narragansett Indian Tribal Historic Preservation Office (NITHPO).

3.3 State of Rhode Island

Rhode Island has many resource protection laws, policies and programs similar to other states and often developed in conformance with federal laws. These are summarized (see Appendix A) along with those which are somewhat unique to RI. Statutes are referenced with respect to the RI General Laws (RIGL). Unlike CT, regulation of wetlands and onsite wastewater treatment systems (OWTSs, also known as septic systems) is done by RI DEM at the state level rather than at the

local level as in neighboring states. State enabling legislation related to planning and zoning requires implementation at the local level in conformance with state Guide Plans and procedures.

3.4 State of Connecticut

Connecticut's resource protection laws, policies and programs are similar to those in other states and are often developed in conformance with federal laws. These are summarized below along with those which are somewhat unique to CT. Statutory reference is made to the Connecticut General Statutes (CGS) and regulatory reference is made to the Regulations of Connecticut State Agencies (RCSA). Unlike RI, Connecticut has a formal permit program for the diversion of groundwater or surface water at a rate of 50,000 gallons per day (gpd) or more. Connecticut's Natural Diversity Data Base program has a formal process for reviewing potential impacts to rare species and their habitats, unlike Rhode Island's program. The CT coastal zone jurisdictional area extends 1,000-feet landward of tidal waters and wetlands; this is significantly larger than the RI 200-foot CRMC jurisdictional area. State enabling legislation related to planning and zoning requires implementation at the municipal level in conformance with state guidance and procedures. CT has policies that require each town to have a Conservation and Development Plan.

4.0 Summary Overview of All Towns

This section summarizes the major regulatory and plan elements of resource protection in the subject towns. It is organized by major element: community plans, zoning, land development regulations, and special resource protection. For all towns these elements are interrelated, but the exact substance and interrelationships of regulations and plans varies by town and state. If protection for a special resource is contained in the zoning ordinance it will first be described in the zoning section for that town (groundwater protection districts, for example). In many towns, the zoning ordinance, land development/subdivision regulations, and some resource ordinances are provided separate and apart from the main code of ordinances. Not all towns have updated their plans and regulations, and sometimes internal inconsistencies exist.

4.1 Community Plans

All towns in the study area have some sort of master plan to guide growth and development in the future. Both Rhode Island and Connecticut have state laws that govern the preparation and content of such plans. Both states provide financial support to towns for plan preparation. In Rhode Island, these plans are called Comprehensive Community Plans (Comprehensive Plans, or "Comp Plans"). In Rhode Island these local plans must be prepared in conformance with the RI Comprehensive Planning and Land Use Regulation Act (RIGL 45-22.2) and associated regulations and guidance from the RI Department of Administration Division of Statewide Planning (RIDSP, 2018). In Connecticut, this plan is typically called the Plan of Conservation and Development (POCD). Those local plans are guided by the State of Connecticut 2013-2018 Conservation and Development Policies Plan (OPM, 2013), in accordance with state law (CGS 8-23). In both states, towns may have supplemental or associated plans that focus on an important community planning element such as open space or economic development. Such supplemental or related plans are described below to the extent they are relevant to resource use or protection in the study area.

All of the towns include goals promoting the preservation of natural resources, open space, and the rural/historic character of the town. In most cases these preservation goals are tied to water supply protection, protection of development from flood damage, and for some towns the protection and promotion of the tourism industry. Towns also recognize the importance of resource protection for financial sustainability, understanding the loss or diminishment of certain resources may pose adverse financial consequences to the town. All towns protect the study river corridors to a large extent, and provide meaningful development regulations that protect water resources in the river's watersheds. Many towns promote green-ways and interconnected conservation lands; some towns specifically support the Wood-Pawcatuck Wild and Scenic River Study effort.

4.2 Zoning

All of the towns in the study area also have enacted zoning ordinances that place controls on land uses to protect public health, safety and general welfare. Because they must be consistent with state enabling legislation (which is, in turn, based on federal model legislation) the ordinances all tend to be very similar in form, even though there is a wide variation in the types of zones established and the types of uses allowed. Zoning ordinances typically consist of two parts. The first part is

the text. The text establishes zoning districts and indicates which uses are allowed within each district. Other common parts of the text include:

- Legal Authority, and Purpose
- General Provisions
- Zoning Districts and Regulations
- Use Tables
- Dimensional Requirements
- Nonconforming Uses, Structures, and Lots
- Impact Standards, Performance Standards, Review/Approval Criteria
- Administration, Enforcement and Appeals
- Amendment Procedures

The second part of the Zoning Ordinance is the Zoning Map. The Zoning Map shows the locations of the various zoning districts within the town. This analysis concentrates first and foremost on the types of zones designated in proximity to the study rivers with an eye to evaluating the level of resource protection provided by the Ordinance. Protection of watershed ORVs is also described. In addition, many communities include "overlay" districts that provide a higher level of resource protection than the underlying district. Typical overlay districts within the study area include aquifer and groundwater protection zones, wellhead protection areas, flood hazard zones, historic village districts and occasionally wetland and riverfront protection zones. Some overlay zones are explicitly mapped, others are incorporated by reference to specific maps such as the local Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs).

Finally, some zoning ordinances include special measures that allow proposed developments to be configured in such a way as to protect natural resources while still providing the same development densities as conventional development. These allow uses to be arranged on one part of a property at higher densities while leaving other parts of the property undeveloped to protect open space, agricultural land, historical resources, wetlands, floodplains and other valuable natural resources. Examples include residential compounds, cluster development ordinances, and Planned Unit Developments (PUD). The terms "Conservation Development" and "Low Impact Development" (LID) are also referenced in zoning and land development regulations, but often with different meanings and specificity in different towns.

In each case, the Zoning Ordinance also establishes a Zoning Board of Review or Zoning Board of Appeal. The responsibility of the Zoning Board is to hear cases where the literal application of the Ordinance would result in a "hardship" for an

individual property owner and/or would deprive a property owner of all reasonable use of the land. The Board is empowered to grant variances in those cases assuming the conditions for "relief" have been met. Most Zoning Boards also grant Special Use Permits for uses where special conditions must be met as a pre-requisite to development. They also hear appeals of decisions made by the Planning Board/Planning and Zoning Commission in the development review process described below.

Town zoning provides very good protection of study river corridors for the most part, especially in combination with large areas of protected conservation lands. Many of the zoning challenges with respect to resource protection are a result of the historic village developments along the river. While these villages are an important asset to the cultural and scenic values of the rivers, they often pose challenges to new growth and redevelopment because of lot densities and inadequate infrastructure (wastewater disposal and water supply, for example) in addition to the historic and water resource constraints such as flood hazards.

4.3 Land Development Regulations

All of the study area towns also have adopted a set of land development regulations. These may also be referred to as the "Subdivision Ordinance" and/or the "Land Development Ordinance". These typically apply to subdivision of land into three or more lots, and large development projects. While the Zoning Ordinance indicates WHAT uses are permitted on a property, the land development ordinances indicate HOW those uses may be developed. They specify the procedures by which the local regulatory authorities will review and approve proposed land subdivision and development projects and set minimum standards for land development projects that may include more detail than that provided in the Zoning Ordinance. Unlike the Zoning Ordinance, the land development regulations often provide specific requirements for evaluation and protection of natural and cultural resources during the subdivision and land development process. Some towns also have separate but related design standards that are important to preserving natural resources and scenic views.

4.4 Special Resource Protection

Each of the Towns in the study area also has its own set of local ordinances. These local laws cover a wide range of topics based on local priorities. Many of them provide specific protections for resources considered important within the communities. They range from nuisance laws about garbage and debris to "dark

skies" ordinances that control outside lighting. This study reviews the local requirements and guidance contained in the ordinances for the protection of wetlands, floodplains, groundwater aquifers, public wells, and any other resources that may related to the protection of the rivers.

4.4.1 Wetlands and Watercourses

Wetlands and Watercourses are protected by state law in both Rhode Island and Connecticut. In Rhode Island, development projects with a potential impact on wetlands are reviewed primarily by the Rhode Island Department of Environmental Management (RI DEM) and wetlands in the vicinity of the coast are regulated by the Coastal Resources Management Council (CRMC). Wetlands are identified by soils, vegetation and hydrology and projects are encouraged to avoid, minimize and mitigate wetlands impacts. Some projects include construction of replacement wetlands but 1:1 replacement by area is not normally required. Rhode Island communities are allowed (at least at present) to administer their own wetlands regulations in existence prior to the new wetland statute (12/2015), but their jurisdiction is limited by the state.

In Connecticut, the cities and towns implement wetlands protection through local Inland Wetlands and Watercourses Commissions (IWWCs or Wetland Commissions) pursuant to the state law. The Wetlands Commissions review development projects at the town level. Jurisdictional areas include the inland wetlands, all watercourses (intermittent and perennial), and a minimum 100-foot "upland review area" surrounding the wetlands and watercourses. Inland wetlands are primarily identified by soil indicators and applicants are required to avoid wetlands, minimize encroachment and mitigate adverse impacts. Mitigation typically requires 1:1 replacement for impacted wetlands by area although exceptions are made where it can be established that replacement of functions and values can be accomplished without 1:1 replacement. The Town of Stonington also includes coastal zone wetlands that are regulated pursuant to state law and the town's Coastal Area Management regulations.

4.4.2 Floodplains

All of the towns in the study area have adopted flood hazard ordinances. These local ordinances are required by the Federal Emergency Management Agency (FEMA) as a condition of participation in the National Flood Insurance Program (NFIP) and most of them are based on the FEMA minimum requirements. The National Hazard Mitigation Planning Program requires each state have statewide natural hazard mitigation planning. As a result, most of them include the same, or similar, provi-

sions that protect floodways, prohibit/regulate development in flood hazard areas, regulate placement of mobile homes in floodplain, and establish requirements for stormwater management, debris management, and often establish erosion and sedimentation control requirements for flood prone areas. Although zoning and subdivision regulations often include flood-related provisions, the town's flood hazard ordinances are often a separate chapter of the town code, include specific reference to the NFIP, and cite the FEMA Flood Insurance Rate Maps (FIRMs) as depicting the regulated area. Many towns have included flood hazard overlay districts to their zoning regulations with the flood hazard boundaries corresponding to those depicted in the FIRMs.

4.4.3 Stormwater

Regulations regarding stormwater management for new development are generally included in the zoning and subdivision regulations. Additional stormwater ordinances have been adopted by municipalities such as Westerly and Stonington with town-owned stormwater drainage systems as required by the federal Clean Water Act and administered by RI DEM and CT DEEP (the so-called MS4 requirements). Restrictions on new connections, inspection, enforcement and management of stormwater infrastructure are specified.

4.4.4 Groundwater

Most of Rhode Island's groundwater reservoirs and recharge areas lie within the Wood-Pawcatuck Watershed. These represent high yield aquifers suitable for public water supply. They were created by glacio-fluvial deposits during the ice age. Areas outside these groundwater reservoirs are also used for individual water supplies and small community and non-community wells. Most of the RI communities in the Wood-Pawcatuck Watershed have groundwater protection overlay districts with additional resource protections including land use restrictions and performance standards for new development.

In Connecticut, aquifers are an essential natural resource and a major source of public drinking water. Significant aquifers are associated with the Shunock, Green Fall, Ashaway and Pawcatuck Rivers. To protect these groundwater resources from contamination, Connecticut established the Aquifer Protection Area Program. This program, administered by CTDEEP, identifies critical water supply aquifers and protects them from pollution by managing land use. Protection requires coordinated responsibilities shared by the state, the municipality, and the water company to ensure a plentiful supply of public drinking water for present and future genera-

tions. Both Stonington and North Stonington have high quality, high yielding aquifers in the study areas of the Shunock, Green Fall, Ashaway and Pawcatuck Rivers.

4.4.5 Wastewater (Septic Systems and Sewers)

Subsurface sewage disposal systems, also known as septic systems or onsite wastewater treatment systems (OWTSs) are regulated by municipalities in Connecticut and by RI DEM in Rhode Island (with various levels of local participation by RI towns). In Rhode Island, OWTSs are regulated, reviewed under the Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems. Rhode Island communities are not (yet) prohibited from enforcing their own standards that are stricter than the state standards. The most common of these local ordinances establish On-site Wastewater Management Plans (OWMP) and associated Wastewater Management Districts. An OWMP describes the elements of the municipal management program for septic systems. Program elements may include requiring system inspections, enhancing homeowner education, or specifying more stringent treatment requirements in environmentally sensitive areas. Once approved by RI DEM, an OWMP makes a town eligible to apply to the Community Septic System Loan Program (CSSLP). Local OWTS setbacks from wetlands in excess of state standards will not be allowed after RI DEM regulations are adopted in accordance with the revised Freshwater Wetlands Act enacted in December 2015. At this time no implementing regulations have been proposed by RI DEM.

In Connecticut, septic systems, defined as subsurface sewage disposal systems, are regulated by Public Health Code (PHC) Section 19-13-B103 and the associated Technical Standards for Subsurface Sewage Disposal Systems (Technical Standards). Septic systems with design flows of 7,500 gallons per day (GPD) or less are regulated and permitted by the Local Director of Health. Large septic systems serving buildings with design flows of 2,000 to 7,500 GPD, and all systems with design flows greater than 7,500 GPD must be approved by the CT Department of Energy and Environmental Protection.

4.4.6 Soil Erosion and Sedimentation

All of the communities in the study area have their own soil erosion and sedimentation control ordinances. These ordinances tend to be oriented toward fulfilling certain requirements of the federal Clean Water Act as implemented through each state's environmental agency; they require minimum controls on soil disturbance during construction to reduce soil erosion and pollutant discharges from stormwater runoff. Relatively small areas of soil disturbance may be regulated, and a

determination of applicability is typically required from the building official for such disturbances. Where applicable, a soil erosion and sedimentation control plan (SESCP) is required to be submitted for local review and approval. Most towns in the study area have such regulations and all require such control plans as part of their land development regulations. In Rhode Island the RI DEM or CRMC reviews SESCPs associated with wetland permit applications, or otherwise regulates land disturbing activities over one acre through its RIPDES General Permit for Storm-water Discharge Associated with Construction Activity. Most towns have a local ordinance that regulates land disturbances much smaller than one acre; in some cases the threshold of disturbance may relate to the proximity to regulated water resources.

4.4.7 Resource Extraction

Some of the study area communities, particularly those with a history of quarrying and/or sand and gravel excavation, have adopted local ordinances that regulate mining and resource extraction. These are typically adopted to work in conjunction with erosion and sedimentation control regulations, to reduce noise, protect air and water quality, and regulate truck traffic associated with extractive industries.

4.4.8 Solid Waste

Most study area communities also have local bylaws that regulate solid waste. These vary widely, but almost all are based on the community "Police Powers" for the protection of public health and safety. They typically prohibit unauthorized disposal, littering, trash and debris and, because recycling is mandatory in both Rhode Island and Connecticut, most of them also establish procedures for recycling as well as for solid waste storage, collection and disposal.

4.4.9 Vegetation

Relatively few of the study area towns have ordinances that relate to the protection of vegetation, except perhaps as it relates to maximum impervious cover allowed on a lot. Some towns have tree ordinances, but these are typically restricted to public street trees and/or to trees on public property. Local tree ordinances provide for minimal fines for removing public trees without permission of local authorities. Some towns also have a "Tree Warden" charged with managing publicly owned trees, trimming limbs that overhang streets or utility wires and, as needed, removing trees that are seriously damaged, diseased or otherwise a threat to public safety. A few towns have adopted ordinances to protect rare, threatened or endangered plant species, typically by prohibiting collection and/or by regulating

disturbance within critical habitat areas. Most towns' land development regulations include provisions for vegetated buffers and/or landscaping associated with large development proposals.

4.4.10 Special Habitats

Although community plans typically identify important habitat areas in each town, and most of the towns include general requirements for protection of special habitats as part of their development regulations, very few study area towns have chosen to protect special habitats for fish, wildlife, or vegetation directly through local ordinances. Hunting, fishing, and logging are regulated at the state level supplemented by local ordinances. These typically have a stronger focus on public safety and resource sustainability rather than habitat protection. It appears the most common means of protecting special habitats in the study area is for the communities to acquire the land containing those important habitat areas and protect them through public ownership. Open space set-asides and in-lieu fee contributions to public open space are often targeted towards habitat protection. Each state's environmental agency provides mapping of rare species and critical habitats that towns use in conservation planning. The CT DEEP Natural Diversity Data Base program maps have regulatory importance with regard to certain CT DEEP permit programs pursuant to the CT Endangered Species Act and other state laws. In contrast, the RI Natural Heritage Program provides no specific protection for state listed rare species or critical habitats, rather, the RI DEM partners with the private non-profit RI Natural History Survey to track rare species occurrences, update mapping and provide information through RIGIS and direct consultation.

4.4.11 Open Space Conservation

All the study area communities have some local ordinances or regulations for protection of open space. Some require dedication of public open space (or equivalent in-lieu fee payment) as a condition of approval for larger developments. Most require that open space at least be identified as part of all major land development projects. All the study area towns have some form of Land Trust, Conservancy or other conservation organization that functions to acquire and protect open space locally. These organizations own land outright, hold conservation easements, and serve as rights holders for acquisition of property development rights. Some Land Trusts are town-specific and are active in only one town; some of these are private and some towns have a municipal land trust. Others are natural resource oriented and are active in more than one community. Jurisdictions frequently overlap such that several communities are served by multiple such organizations. (There are six different Land Trusts currently active in Westerly, RI for example.)

Most of the Land Trusts and Conservancy groups active in the study area have established criteria by which they assess properties under consideration for acquisition and protection. Where those criteria are publicly available, they almost universally include proximity to major rivers, streams, and surface water bodies as important criteria. Most weight access to surface water very highly in choosing properties for protection. Conservation Commissions in some towns are very active in the identification, prioritization and acquisition of open space for conservation. Most study area towns call for interconnections between parcels of dedicated open space, providing greenbelts or wildlife corridors, often organized around the town's river network.

Towns also typically include other types of open space, conservation, and recreation lands in their open space planning and conservation efforts. These include federal and state protected areas, lands preserved as open space temporarily through easement or tax mechanisms (farm, forest and open space programs for example), undeveloped municipal lands, and private recreation lands.

4.4.12 Historic/Cultural Resources

The study rivers in the Wood-Pawcatuck River watershed include historic villages that date back to the early days of European colonization. Native American cultural resources are also present throughout the Wood-Pawcatuck Watershed as well as the riparian corridors. Historic and other cultural resources occur along the rivers due to their importance for fisheries, transportation and water power. A number of municipalities have enacted regulations to protect these resources, including provisions for resource identification and preservation as part of land development regulations, and historic village overlay districts in the zoning ordinance. Where enacted, such village overlay districts typically attempt to preserve the historic village character with design guidelines/standards. Some towns may require historic/archaeologic studies as part of the land development review process. Most of the historic villages along these rivers include old mills that present difficult challenges for preservation and reuse.

4.5 Summary Comparison Matrix

The Summary of Plans and Ordinances lists each town along with an indication of the primary regulatory basis of resource protection, if any, for the natural and cultural resources associated with the study river corridors and watersheds.

Table 2. Comprehensive Plans (RI) and Plans of Conservation and Development (CT), Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Rivers[1]	Plan Date & Status[2]		Future Land Use Plan/Map Protection of River Values[3]		Comments
		Adopted Plan	Draft Plan	Corridors	Watersheds	
Charlestown	P	2006 E	expected 2018	Yes	Yes	2 historic villages
Exeter	B, QU, W	2011 E		Yes	Yes	village approach
Hopkinton	A, P, W	2/5/2018		Yes	Yes	WPWSR support
North Kingstown	Only C (QU) watersheds	8/20/2008 E	July 2016	Not Applicable	Yes	
Richmond	B, P, QU, W	9/20/16 E		Yes	Yes	WPWSR support
South Kingstown	C, P, QU	1/11/16 E	expected 2018	Yes	Yes	
West Greenwich	QU, W	2008		Yes	Yes	plan not accepted by state
Westerly	P	11/7/2011 E	expected 2018	Yes	Yes	
North Stonington	GF, P, S	2/12/2013		Yes	Yes	WPWSR support, OS Plan 2013
Sterling	W	June 2009		Yes	Yes	
Stonington	P	5/7/2015		Yes	Yes	OS Plan 2007
Voluntown	GF, W	2010		Yes	Yes	

Notes:

1. A=Ashaway, B=Beaver, C=Chipuxet, GF=Green Fall, P=Pawcatuck QU=Queen-Usquepaugh, W=Wood, watershed=C & QU watershed only
2. Date of Town adoption; E = expired
3. Wild and Scenic River values are free-flowing condition, water quality and Outstandingly Remarkable Values (ORVs) identified in the study watershed

Table 3. Zoning Ordinances, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Source	Date	Zoning Districts[4]		Cluster	Comments
			Corridors	Water-sheds		
Charles-town	Code Ch. 218	1/8/2018	OS, LDR, VO, GWO	OS, LDR, VO, GWO	Yes	VO w/ MDR, C, I
Exeter	Code Ap. A	10/2/2017	OS, LDR, GWO	OS, LDR, GWO, C, MU	Yes	C, MU along Rt. 2 south
Hopkinton	Code Ap. A	12/21/2007	LDR, C, M, GWO	LDR, C, M, GWO	Yes	Also Code Ch 13.5
North Kingstown	Code Ch. 21	7/17/2017	Not Ap-plicable	LDR, C, I, GWO	Yes	
Richmond	Code Ch. 18	1/2/2018	LDR, C, I, GWO	LDR, C, I, GWO, PD	Yes	
South Kingstown	Code Ap. A	2/12/2018	OS, LDR, GRW	OS, LDR, I, C, GWO	Yes	
West Greenwich	Ord. 16[5]	5/10/2017	OS, LDR, I	OS, LDR, MDR, HDR, I, C, MU, GWO, HMO	Yes	Wood - OS & LDR, Queen - OS, LDR, I
Westerly	Code Ch. 260	2/26/2018	OS, LDR, MDR, HDR, I, C, MU, GWO, HMO	OS, LDR, MDR, HDR, I C, MU	Yes	River Corri-dor Overlay is reserved
North Stonington	Indep. Doc.[5]	11/17/2017	LDR, VO, C, I, GWO	LDR, VO, C, I, GWO	Yes	
Notes:	4. Zoning districts generalized to facilitate comparison, see town discussion and Appendix A maps and ordinances for town specific zones. Does not include overlay districts for flood hazards or wetlands. District codes: C=Commercial; GWO=groundwater/aquifer protection overlay; HMO=Historic Mill overlay; I=Industrial; LDR/MDR/HDR=Low, Medium, High Density Residential (2+ acre, 1 ac. +/-, and 0.5 ac. or smaller lots, respectively; M=Manufacturing, MU=Mixed Use; OS=Open Space; PD=Planned Development; VO=Village Overlay					

Table 3, continued.

Town	Source	Date	Zoning Districts[4]		Cluster	Comments
			Corridors	Water-sheds		
Sterling	Indep. Doc.[5]	1/29/2018	LDR, MU see com-ments	LDR, MU see com-ments	Not Explic-itly	one primary zone allows various uses if they meet standards and are not prohibited
Stonington	Indep. Doc.[5]	2/1/2018	LDR, MDR, HDR, C, I, MU, GWO, CAMO	LDR, MDR, HDR, C, I, MU, GWO, CAMO	Yes	Pawtucket Village, Industrial Heritage Re-Use and Heritage Mill Districts along river. Also sep. Aquifer Pro-tection Regs
Voluntown	Code Sec. 4[5]	3/1/2012	OS, LDR	OS, LDR	Not Explic-itly	
Notes:	4. Zoning districts generalized to facilitate comparison, see town discus-sion and Appendix A maps and ordinances for town specific zones. Does not include overlay districts for flood hazards or wetlands. District codes: C=Commercial; GWO=groundwater/aquifer protection over-lay; HMO=Historic Mill overlay; I=Industrial; LDR/MDR/HDR=Low, Me-dium, High Density Residential (2+ acre, 1 ac. +/-, and 0.5 ac. or smaller lots, respectively; M=Manufacturing, MU=Mixed Use; OS=Open Space; PD=Planned Development; VO=Village Overlay					

Table 4. Land Development Regulations, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Source	Date	Protection of River Values[3]		Comments
			Corridors	Water-sheds	
Charles-town	Code Ch. 188	1/8/2018	Yes	Yes	requires cluster resi-detial
Exeter	Code Ap. B	10/2/2017	Yes	Yes	TDRs
Hopkinton	Code Ch. 18[5]	9/3/2014	Yes	Yes	Also Stormwater and Hazard Mit. Plans
North Kingstown	Code Ap. A	7/17/2017	Not Ap-plicable	Yes	Little opportunity for new development in watershed
Richmond	Code	10/27/2015	Yes	Yes	
South Kingstown	Indep. Doc.5	12/12/2012	Yes	Yes	
West Greenwich	Ord. 4[5]	5/18/2015	Yes	Yes	
Westerly	Code Ch. A261	2/26/2018	Yes	Yes	
North Stonington	Indep. Doc.[5]	11/2/2015	Yes	Yes	
Sterling	Indep. Doc.[5]	3/23/2010	Yes	Yes	
Stonington	Indep. Doc.[5]	8/8/2016	Yes	Yes	Also sep. Design Re-view Guidelines 8/09, Technical Standards 3/21/11
Voluntown	Code Sec. 3[5]	7/1/2011	Yes	Yes	
Notes:	3. Wild and Scenic River values are free-flowing condition, water quality and Outstandingly Remarkable Values (ORVs) identified in the study watershed 5. Published as a separate document from town code.				

Table 5. Special Resource Protection, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Study Rivers	Wetlands & Watercourses	Flood-plains	Storm-water	Ground-water
Charles-town		Ch. 174, 188, 210, 218	FHO, Ch. 117	Ch. 188	GWO
Exeter		App. A Sec. 2.5.2, (Ch. 50)	Ch. 22 Art. IV	App. A Sec. 2.5.2	GWO
Hopkinton		Ap. A Sec. 33	FHO, Ap. A Sec. 33	Ch. 13.5, SWMPP	GWO
North Kingstown		Ch. 8 Art. IX	FHO, Sec. 21-188	Ch.8 Art. IX	GWO, Ch. 8 Art. VII, S. 21-186
Richmond		LDSR	FHO, Ch. 18.44	Ch. 8.06	GWO, Ch. 18.7
South Kingstown		Ch. 20, 21, LDSR	FHO, Ap. A Sec. 601, Ch. 21	Ch. 20	GWO, Ap. A Sec. 602
West Greenwich		Ord. 1a, 4, 16 Art. VII Sec. 10, Art. IX	Ord. 4, 91	Ord. 4, 90	Ord. 4, 16, 84
Westerly	Sec. 260-57, (260-15E & -56 res)	Ch. 86, 223, 260, A261	FHO, Ch. 127, 260, A261	Ch. 223, 224. 260, A261	GWO Sec. 260-52, Ch. 251
North Stonington		IWWC reg.s, LDSR	FHO, Ch. 10, Zoning 307, LDSR	Ch. 10, Zoning 1112, LDSR	GWO APA Reg.s, Zon-ing 703
Sterling		IWWC reg.s, Zoning Ap. A, C, LDSR	Code p. 47, 78, 97, LDSR Sec. 7	Code p. 124, Zoning Ap. A, C, LDSR S. 10	Code p. 124, LDSR S. 11
Stonington	P.R. Harbor Manag. Com., Zon-ing 4.9.4.7	IWWC reg.s, Zoning 7.3, LDSR	FHO, Zoning 7.7, LDSR 7.5	Ord. Il-licit Disch. …,Zoning 7.13, LDSR 5.7, 5.9, 7.4	GWO, Zon-ing 7.2, Aquifer Prot. Regs
Voluntown		IWWC reg.s, Zoning 8.4, LDSR	Code p. 66, Zoning 8.5, LDSR 5.4	Road Ord. p. 47, LDSR 4.3, 5.4.3	Zoning 9.5.1, LDSR 3.1.2 (wells)

Table 5, continued. Special Resource Protection, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Septic Systems & Sewers	Soil Erosion & Sediment Control	Resource Extraction	Solid Waste	Vegetation
Charles-town	S. 11	Ch. 174, Ch 188	Ch. 174, 218	Ch. 165, 218	Ch. 163, 188
Exeter	App. A Sec. 2.5.2	Ch. 23	Ch. 30 Art. I, II	Ch. 34	App. A Sec. 2.5.2
Hopkinton	WWMD Ch. 21	Ch. 13.5	Ap. A, Ch. 17, Earth Rem. Ord.	Ch. 16	Ch. 13.5
North Kingstown	Ch. 8 Art. III, VIII	Ch. 8 Art. IX Div II	Ch. 16	Ch. 6	Ch. 8 Art. IX, Ch. 17 Art. IV, Ap. A
Richmond	LDSR	Ch. 15.06	Ch 15.16	Ch. 8.18	Ch. 18, LDSR
South Kingstown	WWMD, Ch. 19 Art. 2	Ch. 20 Art. 2	Ap. A	Ch. 15	Ch. 18.5, LDSR
West Greenwich	Ord. 4, 7	Ord. 4, 79	Ord. 16	Ord. 1a, 2, 7, 28, 44, 60, 74	Ord. 4, 16 Art. VII, IX
Westerly	Ch. 206, 260, A261	Ch. 224, 260-89, A261	A261, Temp Measure 4/3/17	Ch. 217	CH. 128, 260, A261
North Stonington	Ch. 9 Art. II	Ch. 10, Zon-ing 1111, LDSR	Zoning 202, 1006	Ch. 17	Zoning CH. 10 & 11, LDSR
Sterling	Code p. 24, LDSR S. 11	Code p. 97, 124, Zon-ing, 6.03, Ap. A, LDSR Sec. 6	Code p. 15, 124, Zoning Ap. A	Code p. 30, 75, 106, Zoning 116.14	Code p. 124, Zon-ing Ap. A, C, LDSR 2.6
Stonington	Zoning 6.6, 7.2, 7.8, 8	Zoning 7.6, LDSR 5.8, 7.6	Zoning 7.5	Ord. Solid Waste	Zoning 2.16
Voluntown	Zoning 3.2.2, 9.5.1, LDSR 4.3	Zoning 10.4.1, LDSR 4.4	Zoning 9.5.7	Recycling Ord. p. 21, 27, Zoning 8.3	LDSR 4.3, 8.1.2

Table 5, continued. Special Resource Protection, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Special Habitats	Open Space/ Conservation	Historic/ Cultural Resources
Charles-town	Ch. 188, 218	Ch. 11, 163, 184, 218	VO, Ch. 188, 218
Exeter	App. A Sec. 2.5.2	App. B Sect. 5	App. A Sec. 2.5.2
Hopkinton	Ch. 13.5	LT, Ch. 19.7, LDSR	Ch. 7, 13.5
North Kingstown	App. A 16.6.3	Ch. 21 Art. VII, Sec. 21-218	Ch. 21 Art. XIII, Sec. 12-5
Richmond	LDSR 13.2.3.1	Ch. 18.38, 18.41, LDSR Art. 4	Ch. 18, LDSR
South Kingstown	Ap. A Sec. 510	LDSR Art. III, V	Ch. 14 Art. 2, HOD, Ap. A Sec 600
West Greenwich	Ord. 4, 16 Art. IX	Ord. 4, 16 Art. VII, LT, Ord. 67	Ord. 4, 16 Art. VII, IX
Westerly	Sec. 260-84, A261-30	LT, Ch. 30, 260-13, 260 Art. IX	Ch. 137, 260 (-55 res), 260-57, A261
North Stonington	Zoning 1009.4, 13 J, LDSR 6.6	Ch. 16-7, Zoning 505, LDSR	Zoning 702, 1109, LDSR
Sterling	Zoning Ap. C	Zoning Ap. C, LDSR Sec. 8	Zoning Ap. B, C, LDSR S. 5
Stonington	Zoning 2.16, 8.8, LDSR 7.9	Zoning 6.6.22, LDSR Ch. 8, 10	Zoning 6.6.24, 8.8, LDSR 7.8
Voluntown	LDSR 8.1.2	LDSR 7.1, 7.3	Zoning 10.2, LDSR 4.3

Table 6. Code of Ordinances Sources, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	Date	Source, Online or Other	Comments
Charlestown	1/8/2018	ecode360.com/CH1115	
Exeter	10/2/2017	library.municode.com/ri/exeter/codes/code_of_ordinances	
Hopkinton	12/21/2007	library.municode.com/ri/hopkinton/codes/code_of_ordinances	
North Kingstown	7/17/2017	library.municode.com/ri/north_kingstown/codes/code_of_ordinances	
Richmond	3/6/2018	clerkshq.com/default.ashx?clientsite=richmond-ri	
South Kingstown	2/12/2018	library.municode.com/ri/south_kingstown/codes/code_of_ordinances	
West Greenwich	undated 2016-2018	www.wgtownri.org/town-clerk/pages/ordinances	Each Ord. sep. dated doc.
Westerly	2/26/2018	ecode360.com/WE1997	
North Stonington	9/18/2017	library.municode.com/ct/north_stonington/codes/code_of_ordinances	
Sterling	8/13/2014	www.sterlingct.us/wp-content/uploads/2015/05/Ordinance-Rev-December-17-2014.pdf	
Stonington	undated on town website	www.stonington-ct.gov/special-acts-and-local-ordinances	
Voluntown	2014	NA online	

Table 7. Code of Ordinances, References and Contacts, Wood-Pawcatuck Wild and Scenic Rivers Study

Town	website	Town Clerk	Town Planner/ Planning Department
Charlestown	www.charlestownri.org	(401) 364-1200	(401) 364-1225
Exeter	www.town.exeter.ri.us	(401) 294-3891	(401) 294-2592
Hopkinton	www.hopkintonri.org	(401) 377-7777	(401) 377-7770
North Kingstown	www.northkingstown.org	(401) 268-1551	(401) 268-1572
Richmond	www.richmondri.com	(401) 539-9000 x 9	(401) 539-9000 x 6
South Kingstown	www.southkingstownri.com	(401) 789-9331 x 1236	(401) 789-9331 x 1241
West Greenwich	www.wgtownri.org	(401) 392-3800	(401) 392-3800 x 121
Westerly	westerlyri.gov	(401) 348-2508	(401) 348-2562
North Stonington	www.northstoningtonct.gov	(860) 535-2877 x 21	(860) 535-2877 x 26
Sterling	www.sterlingct.us	(860) 564-2657	(860) 564-2275
Stonington	www.stonington-ct.gov	(860) 535-5060	(860) 535-5095
Voluntown	www.voluntown.gov	(860) 376-4089	(860) 376-3867

Lower Pawcatuck River (Photo credit: Dan Hyland)

CHAPTER 5: THE NATIONAL WILD AND SCENIC RIVERS SYSTEM

The National Wild and Scenic Rivers System was established by Congress in 1968 to protect certain outstanding rivers from the harmful effects of new federal projects such as dams and hydroelectric facilities. Since then over 200 rivers or river segments have been protected nationwide, including six in New England. To be considered a "Wild and Scenic" river it must be free flowing and have at least one outstanding natural, cultural, or recreational value.

The Act, Public Law 90-542. States:

> *It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.*

Benefits of Wild and Scenic Designation

A National Wild and Scenic River designation can bring a river system many benefits. Through National Park Service funding and staff support, resources could be made available to help all the partners achieve the protection of the watershed's Outstandingly Remarkable Values (ORVs) resulting in:

- Preservation of a clean and plentiful water supply, through collaborative implementation of the Stewardship Plan and Federal support for partner goals and strategies.
- Protection of the rural character that defines the local communities, through implementation of tools that protect wildlife habitats, historic sites, open space areas and other resources.
- Robust and diverse plant and animal populations that reflect a healthy ecosystem.
- Possible funding support to help towns achieve their open space conservation goals.
- Information and technical support to help town staff perform their functions, saving time and money.
- Small grants to help local schools, towns, civic groups, private landowners and others on projects which support the purposes and goals of the plan.
- National recognition and prestige associated with a designation.
- Outreach and education opportunities that enhance an understanding of the watershed and its characteristics, celebrating the special places in local communities.
- Financial resources to help towns with certain activities that they may have had to otherwise fund on their own.
- Protection of public health through promotion of the natural functions of the river and floodplains for flood control.
- Prevention of federally permitted projects determined to be adverse to the watershed's outstanding values, through the Wild and Scenic legislation mandate that no federally permitted project be allowed to have a "direct and adverse" impact upon the ORVs.

In addition, if designation is achieved, the National Park Service is required to review and comment on all projects that are either federally funded or federally permitted to ensure such activities are consistent with the protection and enhancement of the ORVs that made the river eligible for designation.

Partnership Wild and Scenic Rivers Program

Over the past 25 years, river conservation interests at the local, state and federal levels have worked in loose collaboration to adapt the National Wild and Scenic Rivers Act into an effective, partnership-based approach to national designations. This unique approach called "Partnership Wild and Scenic Rivers" has been recognized by the National Park Service and the US Congress as a distinct and consistent application of the Wild and Scenic Rivers Act. Partnership Wild and Scenic Rivers, currently consisting of thirteen rivers in the northeast and mid-Atlantic states, are federally designated components of the National Wild and Scenic Rivers System that share the following common principles and management systems:

1. No federal ownership of lands.
2. Adjacent land use continues to be governed by local communities and state statutes (as prior to designation).
3. The River Stewardship Plan is written and implemented through a broad participatory process involving guidance from a locally-based Advisory Council, and is locally approved prior to federal designation (as a part of the feasibility study). The Plan, locally approved and endorsed by relevant state and federal authorities, forms the basis of the designation and post-designation management.
4. Administration of the designation and implementation of the Stewardship Plan is accomplished through a broadly participatory Stewardship Council convened for the rivers of the watershed specifically for this purpose.
5. The responsibilities associated with stewardship and protection of the river resources are shared among all of the partners - local, state, federal, and non-governmental, and volunteerism is a consistent backbone of success.

The Partnership Wild and Scenic Rivers program has a proven track record of effectively creating river protection strategies that bring communities together in protecting, enhancing and managing local river resources.

Designation also provides communities with special federal protection of the river. Section 7(a) of the Wild and Scenic Rivers Act describes the specific protections provided to designated rivers:

> *The Federal Power Commission [Federal Energy Regulatory Commission] shall not license the construction of any dam, water conduit, reservoir, powerhouse, transmission line, or other project works under*

the Federal Power Act…on or directly affecting any river which is designated …and no department or agency of the United States shall assist by loan, grant, license, or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river was established…No department or agency of the United States shall recommend authorization of any water resources project that would have a direct and adverse effect on the values for which such river was established…

Designation creates a specific mandate that no federally permitted or funded "water resource development project" shall be allowed that would have a "direct and adverse" impact upon the Outstandingly Remarkable Resource Values that made the river eligible for designation. The National Park Service is charged with ensuring such federal consistency. However, overall river management continues to rely on local control and self-determination and allow existing river uses to continue.

Designation does not establish a federal park or locally undesired federal land ownership. It is important to note designation itself would only affect federally licensed or assisted water resource projects that would impact the river's Outstandingly Remarkable Resource Values. Other types of development would continue to be regulated by local and state land use laws. Designation will not rezone private land or change property rights. Land use controls on private land are solely a matter of state and local jurisdiction. Any changes to local or state zoning regulations stimulated by the designation would only occur through existing procedures at the town or state levels. Wild and Scenic designation also does not give the federal government any authority to infringe on an individual's privacy or property rights.

The Study Process

The story of National Wild and Scenic Rivers designation for the Wood-Pawcatuck Watershed actually began in 1980 when the National Parks Service (NPS) conducted a survey of potential rivers along the east coast to include in the national program. While the criteria at the time was not favorable for the small rivers of New England (this was before the partnership rivers model), the report did identify sections of the Wood and Pawcatuck Rivers as having several Outstandingly Remarkable Values. In particular it was noted that the Wood River had the highest biodiversity of any river in New England. Due in large part to this report, the Wood-Pawcatuck Watershed Association (WPWA) was formed in 1983 to protect the rivers of the watershed.

In 2010 WPWA formed a coalition of stakeholders in the watershed to again pursue Wild and Scenic River designation to recognize and protect five rivers of the Wood-Pawcatuck River. The group developed local, regional and state partnerships, gathered letters of support and gained votes of approval from all of the towns that would be involved in a Wild and Scenic Study. Specifically, local interest was expressed in pursuing a "Partnership Wild and Scenic River Study," based on river management models such as the Lamprey River in New Hampshire and Farmington River in Connecticut.

A reconnaissance survey of the Wood-Pawcatuck Watershed was conducted by the Northeast Region of the NPS at the request of Representative Jim Langevin (RI-2) in 2013. The reconnaissance survey provided a preliminary assessment of the eligibility and suitability of the Wood-Pawcatuck Watershed as a candidate for a Wild and Scenic designation according to criteria established under the Wild and Scenic Rivers Act (WSRA). Preliminary findings stated "the NPS reconnaissance survey team has determined that segments of the Wood-Pawcatuck Rivers exhibit free-flowing character and noteworthy natural, cultural and recreational resource values likely to meet eligibility criteria for inclusion in the National Wild and Scenic Rivers System. In addition, the presence of very strong community and interest group support for a Wild and Scenic River Study, together with a demonstrated track record of natural and cultural resource protection, support key elements of suitability for inclusion in the System, and provide a strong indication that a Wild and Scenic River Study would be appropriate and productive. "

The Wood-Pawcatuck Watershed Protection Bill (Study Bill) was introduced in the House of Representatives during the 112th Congress. The Study Bill passed the House but failed to make its way through the complete legislative process. The Study Bill was re-filed in February, 2013 where it again easily passed the House. Senate approval was obtained in late 2014. The Study Bill amends the Wild and Scenic Rivers Act to designate segments of the Beaver, Chipuxet, Queen, Wood, and Pawcatuck Rivers for study for potential inclusion in the National Wild and Scenic Rivers System.

NPS developed a cooperative agreement with WPWA to coordinate the study in 2015. WPWA solicited representatives from each of the twelve towns in the watershed to serve on the Wood-Pawcatuck Wild and Scenic Rivers Study Committee: Charlestown, Exeter, Hopkinton, North Kingstown, Richmond, South Kingstown, Westerly and West Greenwich in RI; North Stonington, Sterling, Stonington and Voluntown in CT. Also included were the two state environmental agencies, Rhode Island Department of Environmental Man-

agement and Connecticut Department of Energy and Environmental Protection; and three key environmental nonprofits organizations, Save the Bay, The Nature Conservancy, and Audubon Society of Rhode Island. NPS provided staff support and overall coordination.

The Study Committee elected to add two more rivers from Connecticut – the Shunock and Green Fall Rivers. They established that all seven rivers meet eligibility under the WSRA and identified several outstandingly remarkable values for each river and the watershed as a whole. The committee developed a stewardship plan that demonstrated ongoing policies and activities that protect the rivers' values. The plan also suggests ways to improve protection to assure the rivers' values will be around for future generations.

The Study Committee also coordinated outreach to the local communities. In June 2018 all twelve towns and both states passed a resolution supporting the designation of the Wild and Scenic Rivers and adopting the Stewardship Plan. A new bill was introduced in September 2018.

Upper Wood River (Photo credit: Denise Poyer)

Pawcatuck River at Avondale (Photo credit: Rebecca Woodward)

CHAPTER 6: ACTION STRATEGIES FOR THE FUTURE

At their September 2017 meeting the Study Committee voted that, based on their determination of regionally and nationally significant values of the rivers, and based on the support of watershed towns, that the committee will pursue Wild and Scenic Rivers designation for the seven rivers in the Wood-Pawcatuck Watershed.

Chapter 5 contains information about the many excellent regulations already in place from the twelve municipalities, as well as Rhode Island and Connecticut state regulations, for each of the Outstandingly Remarkable Values (ORVs). This chapter provides suggested actions which are **voluntary measures** that individual towns, states, federal or non-profit agencies may wish to institute on their own or in conjunction with the Wood-Pawcatuck Watershed Association and the Wild and Scenic Rivers Stewardship Council. Many of these suggested actions are already described in current town, state, and federal regulations, as described in the previous chapter.

Not included in the Mason and Associates' report is a discussion of water quality monitoring in both CT and RI. Key points from the Rhode Island Water Quality Management Plan apply to both states:

- Water quality monitoring is essential for effective water resources management.

- The capacity of the State and its partners to sustain important monitoring programs is an on-going concern.
- Stewardship of aquatic habitats requires monitoring to characterize the ecological health and functioning of the targeted habitat.
- Climate change reinforces the need for monitoring hydrology and habitats that are most vulnerable to its impacts.

In the Wood-Pawcatuck Watershed water quality monitoring is conducted by Rhode Island Department of Environmental Management (RI DEM) through their state monitoring programs (see Part 4, Water Quality Monitoring and Assessment, Water Quality 2035 Rhode Island Water Quality Management Plan), Connecticut Department of Energy and Environmental Protection (CT DEEP) (see CT DEEP Ambient Water Quality Monitoring Program Strategy 2015 - 2024), and the University of Rhode Island Cooperative Extension Watershed Watch Program. Several towns, along with WPWA and the North Stonington Citizen Land Alliance, work with the Watershed Watch program to provide funding and monitoring volunteers. There is also limited monitoring conducted by the US Environmental Protection Agency at a very broad scale usually on a rotating basis.

To monitor threats and assess restoration projects it will be essential to support and expand water quality monitoring at all levels in the watershed.

Identifying Threats

On July 26, 2017 a Rhode Island Stewardship Summit was attended by staff from RI DEM, Rhode Island Department of Administrations Division of Planning, Grow Smart RI, University of Rhode Island (URI) Department of Natural Resources Science, South Kingstown Planning Department, Hopkinton Planning Department, The Nature Conservancy, Save the Bay, National Parks Service (NPS), and several Wood-Pawcatuck Wild and Scenic Rivers Study Committee members. On October 12, 2017 a Connecticut Stewardship Summit was held attended by CT DEEP, Eightmile River Wild and Scenic Coordinating Council, NPS, and several Wood-Pawcatuck Wild and Scenic Rivers Study Committee members. The participants in these summits helped to identify the following threats to the watershed:

- *Climate change*

  Among the negative impacts of climate change, there has been an increase of severe storms, particularly in the northeast region of the country. These storms have resulted in more flooding in low-lying areas along the Wood and

Pawcatuck Rivers. Climate change is also causing increasingly hotter and dryer summers, resulting in drought conditions, warmer streams, and low stream flow.

- *Development including:*
  - ◇ Unplanned residential growth and suburban sprawl from nearby urban regions.
  - ◇ Improper siting of large commercial installations, such as large solar panel installations on low density zoned areas.
  - ◇ Excessive runoff during storms due to impervious surfaces.

  Residential development results in increased impervious surfaces, primarily by creating more roads. Impervious surfaces contribute to stormwater runoff into streams, rivers and ponds, which decreases water quality and increases stream temperatures. Residential developments can increase sediments in adjacent rives, which adversely affects aquatic life. It can also contribute to groundwater contamination of the sole source aquifer. In addition, residential development adds the need for wastewater treatment, either as individual septic systems or large scale treatment plants. While development is a necessary part of any community, steps need to be taken to insure that housing developments have minimal impact on the ORVs of the rivers.

- *Point-Source Pollution*

  There are several points of direct discharge into the twelve rivers, including two sewage treatment plants and one industrial plant on the Pawcatuck River. Improper agriculture practices can contribute discharges of herbicides and nutrients that can harm the streams and rivers.

- *Habitat fragmentation*

  Habitat fragmentation occurs when large blocks of contiguous habitats are subdivided into smaller, isolated parcels. In suburban landscapes such as the Wood-Pawcatuck Watershed, this is caused primarily by building roads and housing developments. These barriers in the landscape make it difficult or impossible for many native species that need to disperse across the landscape to breed, such as turtles and frogs, to travel between habitats that provide for critical parts of their annual cycle. Increased fragmentation can lead to major reductions in the diversity of flora and fauna in a region, particularly native species that require contiguous habitats.

- *Invasive species*

  Invasive species can be detrimental to the native flora and fauna of the Wood-Pawcatuck Watershed. Invasive species are non-native plants or animals that negatively impact native species. They originate from other regions of North America or from other continents. Lacking natural predators that control their populations, they can invade habitats and extirpate native plants and animals. Invasive species are often introduced inadvertently by people who live or recreate in the watershed.

- *Limited resources for protected lands*

  One way to protect lands is to purchase them for conservation. Many organizations can be involved in this process including local land trusts, town municipal land trusts, state and federal agencies and private non-profit organizations. However, these agencies and groups often have limited funds for both the purchase of lands and management of the lands after purchase.

These threats present key management challenges to protecting the ORVs of the rivers and their corridors. Strategies to protect the ORVs can be found in the following plans:

- Rhode Island State Wildlife Action Plan
- Connecticut State Wildlife Action Plan
- Rhode Island Water Quality 2035
- Wood-Pawcatuck Watershed Flood Resiliency Management Plan
- Connecticut Green Plan
- Pawcatuck River Bacteria TMDL
- Connecticut Bacteria TMDL Shunock River

Geology and Hydrology

Geology - The geologic features of the Wood-Pawcatuck Watershed are not currently under threat.

- The Charlestown Moraine is such a large feature that other than land conservation there are no suggestions for special protection at this time. The Champlin Park in Westerly covers a small section of the moraine and allows hikers to see some of the key geological features, such as kames and kettle ponds. This park includes educational signage and explanations regarding the features of the moraine.

- Green Fall Rift Valley is contained almost entirely within the Pachaug State forest.
- Dead Swamp is protected by a conservation easement held by the town of West Greenwich.

Hydrology - There are a number of threats to the hydrology of the Wood-Pawcatuck Watershed. Hydrology is the science that studies the distribution, movements, and quality of water in the watershed.

1. Development – More housing developments in the twelve rural towns in the Wood-Pawcatuck Watershed will lead to more runoff into the rivers, which will cause water quality degradation, erosion, and loss of habitat.
2. Flooding – All seven rivers within the Wood-Pawcatuck Watershed have experienced flood events over the past decade, especially in areas with residential and commercial developments within the floodplain of each of the rivers. Increased flooding is due to:
   a. Buildings located on natural flood plains.
   b. Channelization, or straightening, of the rivers.
   c. Improperly functioning dams and other structures such as road culverts.
   d. Increases in impervious surface that lead to increased water velocity and increased runoff into the rivers.
3. Water withdrawals – There are increasing ground water withdrawals for municipal wells and surface water withdrawals for irrigation. These can cause extreme low flow for small tributaries when there are low rain years, impacting the habitat value of the streams.
4. Climate change – The changing climate causes more frequent storms with larger amounts of rainfall, as well as longer dry periods without measureable precipitation. These changes in precipitation can both increase the timing and severity of flooding, and also decrease stream flow. One of the biggest direct threats of climate change is that stream temperatures may be warming over time. Warm water, especially during low flow months in the summer, can reduce or eliminate appropriate habitat for many macroinvertebrates and wild brook trout.

Hydrology Action Plan

A. Preserve and protect water quality and quantity.

1. **Monitor water quality** - Ensure that state and local organizations such as URI Watershed Watch, a volunteer, citizen-based water monitoring program, continue monitoring and capturing data from geographically representative sites. Collect stream flow and water quality data as needed to support the protection of these resources.
2. **Continue to operate USGS river gages** - Ensure continued monitoring of the US Geological Service (USGS) gages on the Beaver, Queen, Usquepaugh, Shunock, Wood and Pawcatuck Rivers. Two of the gages on the Pawcatuck River have been operating and providing water flow records since 1940.
3. **Address impaired waters** – Impaired waters are those that are impacted by pollution from stormwater runoff, development, and other human processes. Most of these impairments entail excess bacteria or nutrients. Support approved plans by both state and federal agencies for impaired sections of rivers in the designated reaches. This usually entails better management of stormwater runoff.
4. **Protect riparian buffers** – Riparian buffers protect water quality as well as provide habitat and scenic value. State regulations in RI require at least one hundred feet of vegetated buffers on either side of rivers. In CT, DEEP Fisheries Division promotes hundred foot set back. Encourage protection of these buffers and establish replanting programs where feasible.
5. **Protect water flow** - Maintain, protect, and enhance water flow regimes that support the habitat requirements of native river fauna, while accommodating demands for water supply, waste assimilation, commercial, industrial, and agricultural uses. CT Stream Flow Standards and Regulations use approved classifications to protect streams in the watershed. RI uses regulations developed for the Freshwater Wetlands Act.
6. **Conserve land** - Conserve undeveloped and sensitive land within the Wood-Pawcatuck Watershed, particularly within one-quarter mile of the Wild and Scenic River segments, to limit impervious cover and mitigate the effects of urbanization. Corridor protection strategies that prevent or limit placement of infrastructure within the corridor will protect the river system from future erosion and flood losses.
7. **Increase green canopy** - Increase urban/suburban forest canopy cover within developed areas of the Wood-Pawcatuck Watershed to aid in stormwater quantity and quality management, while decreasing runoff temperatures. Also, promote the use of other green infrastruc-

ture techniques, such as vegetated roofs and walls in the built environment, to better manage runoff in the watersheds.

8. **Protect drainage** - Protect and restore natural drainage patterns where feasible through stream restoration projects. One type of restoration is "daylighting," which redirects or uncovers previously buried streams.
9. **Improve water quality** - Use low-impact development techniques to pre-treat runoff prior to discharging to any tributaries.
10. **Practice bioretention** – Biorentention is a way of retaining runoff on a site using such practices as rain gardens or retention basins. They are designed to remove contaminants from the water before it runs into the river. Publicize the benefits of bioretention areas and promote the use of these and other green infrastructure and/or low-impact development techniques for managing runoff from nearby farms and developed areas.
11. **Plan for pollutant spills** - Ensure that the affected towns' public works, fire, or police departments, and both states, have emergency plans for accidental pollutant spills and have equipment for such emergencies on hand.
12. **Follow best practices for road salt and sand** - Work with local municipal Departments of Public Works (DPW), highway departments, and the Connecticut and Rhode Island Departments of Transportation to promote best management practices that minimize road salt and sand runoff to wetlands, streams, and rivers. Research alternatives to road salt, and encourage towns to use them.
13. **Encourage best practices for property owners** - Reduce pollution from landscaping chemicals and reduce water consumption. Provide advice to citizens on proper use of lawn chemicals to prevent overtreatment. Encourage riparian landowners through an education campaign to reduce runoff on their property, minimize impervious surfaces and minimize pesticide and fertilizer use. Often this can be accomplished by maintaining an appropriate buffer between the treated land and the waterway.
14. **Encourage farming best management practices (BMPs)** – BMPs help protect water quality and provide economic benefits. Encourage BMPs by providing financial incentives and technical assistance to farmers.
15. **Consider water in land use planning** - Ensure that land use planning includes adequate water supply resources, stormwater drainage

systems, and wastewater treatment systems (both onsite and centralized wastewater treatment systems) as well as permanent and temporary soil stabilization techniques and groundcover for all disturbed areas.

16. **Identify threats from septic systems** - Partner with towns to identify the degree of threat from potential faulty and/or illicitly discharging septic systems, which may result in bacterial and nutrient contamination of nearby streams and groundwater.

B. Preserve and protect important high- and medium-yield aquifers.

1. **Promote aquifer protection** - Promote extended aquifer protection through land use regulations, acquisitions, and landowner stewardship.
2. **Conserve water** - Actively promote water conservation. Encourage communities to consider mandatory conservation measures to augment volunteer efforts during droughts. Develop homeowner incentives to conserve water.
3. **Encourage rainwater reuse** - Actively promote rainwater harvesting and reuse. Encourage communities to consider requirements for capture and storage of rainfall for non-potable water uses on development projects to help better manage stormwater runoff and reduce the use of potable water. Encourage all landowners in methods of returning water to the ground instead of running off the property, including the use of rain barrels and rain garden installation. (See Rhode Island Drought Management Plan and Connecticut Drought Management Plan)
4. **Preserve hydrology** - Work with planning boards, town engineers, conservation commissions and developers, and landowners to consider maintaining or restoring predevelopment hydrology in order to protect groundwater recharge capability. Appropriate techniques include limiting impervious surfaces, rainwater harvesting, the use of swales and other low-impact development measures, and best management practices that assist infiltration. Post-development runoff cannot be greater than pre-development levels, which is why each town needs staff that is capable of interpreting stormwater calculations.

C. Develop flood resiliency

1. **Protect floodplains and wetlands** - Maintain the ability of floodplains and wetlands to efficiently absorb water and protect the river from runoff-related pollution. Assess floodplain and wetland mapping for the corridors and determine ways to improve it, coordinating with state and federal agencies. Work with town boards to inform them of the importance of floodplains for flood-

water storage and to encourage protection of floodplains and wetlands when considering development proposals.

2. **Mitigate Flooding** – In 2017 the Wood-Pawcatuck Watershed Association produced a Flood Resiliency Management Plan (FRMP) for the Wood-Pawcatuck Watershed (wpwa.org/flood_resiliency.html). This comprehensive document examines all the factors contributing to flooding the watershed and makes specific recommendations to alleviate or mitigate those factors. In general the recommendations are:
   a. Remove, replace, or repair in-stream structures such as culverts, bridges and dams that contribute to flooding.
   b. Conserve and restore flood plains, river corridors, and wetlands in a natural condition.
   c. Reduce runoff volumes, flooding, and water quality impacts through improved stormwater management and the use of green stormwater infrastructure.
   d. Improve stream meanders. Fluvial geomorphic assessments done on the Wood and Pawcatuck Rivers indicate that many areas have been straightened or channelized. This upsets the rivers' natural tendency to meander and evolve a channel form that is in equilibrium, or at balance, with the water and sediment inputs of their watersheds.

Information concerning all these potential projects, including a prioritized list of structures and potential funding sources, can be found in the FRMP. An example of a small project that could be done at a town level is to replace road culverts with box culverts that are open at the bottom. This can be done when the town is ready repair or resurface the road. Some funding may be obtained through state emergency management projects to reduce flooding. An example of a large project which the Stewardship Committee may want to implement would be to restore natural stream meanders in the Pawcatuck River, below the Bradford fish structure.

For the purposes of this Stewardship Plan, the recommendation is to have the Stewardship Committee work with the towns, states, and federal agencies to implement as many of the projects recommended in the FRMP as possible. The advantage of many of these projects is that by reducing flooding issues they also tend to improve water quality and increase habitat values. Therefore many of these projects can also be used to protect and improve other ORVs.

Ecosystems

The Wood-Pawcatuck Watershed is currently seventy-five percent undeveloped. While the exact amount differs between the rivers, all of them benefit from low levels of development and consequently low amounts of impervious surface. Studies have shown that streams in watersheds with less than ten percent impervious surface have good to excellent water quality and more stable stream banks. The 2016 CT Integrated Water Resources Management program address stream protection and restoration. The major threats to ecosystems in the watershed are similar to those for hydrology:

1. Development
2. Climate change

Ecosystem Action Plan

A. Preserve and protect habitat.

1. **Purchase properties and conservation easements** to directly protect land by permanently prohibiting clearing forests and building structures in or near the rivers. Work with local land trusts, non-government agencies, and state agencies to identify and develop a priority list of important habitat parcels.
2. **Protect habitats and corridors** identified as high priority by the Rhode Island and Connecticut Natural Heritage Programs and the State Wildlife Action Plans.
3. **Protect riparian zones** - Work with the states, local communities and landowners to protect riparian zones from unnecessary clearing and land alteration.
4. **Protect vegetative buffers** - Ensure that appropriate buffers are maintained to help lower water temperatures.
5. **Restore streambeds** - Restore streambeds impacted by road sand deposition and seek solutions to reduce future road sand and other sedimentation. Involve town DPWs and state Departments of Transportation as appropriate.
6. **Conserve contiguous habitat** – Continue to work with communities, state agencies, local land trusts and other non-profit entities to identify conservation strategies that will provide contiguous habitat, corridors, and linkages among habitat types to address the needs of diverse plant and wildlife populations.
7. **Carefully site any new trails and river accesses** to make sure they do not encroach into sensitive core habitats.

8. **Protect land corridors** - Focus on creating land protection corridors, dispersal and migratory wildlife routes through which terrestrial and aquatic flora and fauna will be able to move and adapt, as climate disturbance increasingly impacts biological processes and drives species north.
9. **Carefully site new alternative energy installations** – Limit large installations to already impacted areas in the towns. Encourage updated best management practices when located in a river buffer. Develop new town ordinances to properly site installations so that they protect watersheds and forests areas.
10. **Encourage land conservation easements and restrictions** - Educate and encourage landowners to consider Conservation Easements (CE) and the importance of maintenance and enforcement of these restrictions. Consider providing funding to budget-strapped local land trusts whose lack of capacity makes it difficult to do the required annual monitoring of all CEs.
11. **Encourage current use programs** - Encourage conservation and the preservation of existing forest, farm, and recreational land through programs such as Farm, Forest, and Open Space. These programs can be used by landowners who want to keep their land in open space but are not able or willing to execute a permanent conservation restriction/easement agreement.
12. **Reduce light pollution** – Unnecessary ambient lighting can have negative effects on wildlife behavior. This is particularly important along river corridors where wildlife concentrates. The watershed has been identified as part of the last remaining dark sky region in southern New England by The Nature Conservancy. Many towns already have "dark sky" ordinances which other towns could consider adopting. Dark sky ordinances are consistent with the NPS program to protect "night skies as a natural resource," www.nps.gov/subjects/nightskies/natural.htm.

B. Protect and enhance coldwater fisheries resources.

1. **Raise awareness about streams** - Collaborate with anglers' organizations, aquatic biologists, naturalists, local school systems, and others to increase public awareness and appreciation of how headwater streams work. Focus on minimum low flows, the recreational value of coldwater fisheries, and the ways that individuals can both enjoy and contribute to sustaining these remarkable resources. Conduct outreach focused on engineers who develop stormwater systems for projects, municipal members of planning and conservation boards, and others whose decisions affect stormwater management and land use change.

2. **Protect brooks** - Protect small, cold, headwater brooks, which are necessary for reproduction and rearing of juvenile fish and thermal refuge during periods of high temperatures.
3. **Improve culverts and crossings** - Improve stream habitat by replacing and/or upgrading poorly designed culverts and other stream crossings. (See recommendations in the Wood-Pawcatuck Watershed Flood Resiliency Management Plan).
4. **Preserve canopies** - Preserve forest canopies over coldwater fisheries resources to ensure streams remain shaded.
5. **Protect water flow** - Maintain, protect, and enhance water flow regimes that support the needs of native river plants and animals, while accommodating demands for water supply, waste assimilation, commercial, industrial and agricultural uses.
6. **Maintain riverbanks** - Conduct stream assessments to identify and repair man-made bank disturbances and/or erosion impacting natural structure and reducing riparian vegetative cover.
7. **Address data gaps** - Support the Connecticut and Rhode Island State Wildlife Action Plan and the Connecticut DEEP and Rhode Island DEM coldwater fishery programs to address data gaps in brook trout population and status.

C. Protect and Enhance Anadromous Fisheries.

1. **Support fish passage projects** on the all the designated rivers. These include constructing structures such as fish ladders and nature-like rock ramps.
2. **Consider removal of unused dams** – This process should involve the communities to ensure that important functions of the dams are taken into account.

D. Minimize the Effect of Non-Native Invasive Species.

1. **Monitor invasive species** – Work with state agencies to monitor the presence of species that have the ability to thrive and spread aggressively outside their native range, both aquatic and land-based. Help local communities find out about methods for control and eradication. Communicate with and educate the public for prevention and control.
2. **Raise awareness about invasives** - Post signs warning of non-native invasive aquatics at boat launch sites, reminding boaters to check their boats for hitchhiking plants. Provide educational materials for lake and pond associations on invasive terrestrial and aquatic flora and fauna, including the proper cleaning of boats and motors to prevent transport and spread of invasives.

Present programs and prepare articles for local media to educate the broader public about aquatic invasives, how to identify them, and things individuals can do to prevent the establishment and spread of invasives.

3. **Monitor invasive aquatic weeds** - Where feasible as time and funding permit, conduct baseline mapping of aquatic invasive weeds along the rivers using Rhode Island and Connecticut state guidelines. Additionally, those areas previously mapped should be periodically revisited to determine if any invasive plant growth has occurred.
4. **Encourage native plantings** - Encourage landscaping using native plants, at home and at businesses, to support native wildlife, particularly pollinators. Planting native species reduces the potential for new invasive species from other areas to establish themselves in the watershed
5. **Organize clean-up efforts to reduce invasive plants** - Support biodiversity in riparian habitat by organizing river clean-up days with local volunteers to remove common terrestrial non-native invasive species such as Japanese knotweed, Japanese barberry, Asian bittersweet, and glossy buckthorn.

E. Educate the public about river ecology and ways to keep rivers healthy.

1. **River signage** – have the name of each river posted at every bridge crossing. Include the words "A Wild and Scenic River".
2. **Engage town and state agencies** - Work with town DPW road crews and Rhode Island and Connecticut Department of Transportation agencies who could help alert the public to the significance of Wild and Scenic Rivers.
3. **Raise awareness through events** - Sponsor local events to raise public understanding about native wildlife and the impacts of development patterns on habitat and ecosystem integrity. For example, provide Wild and Scenic River outreach information at community events, fairs, festivals, canoe races, fishing events, and other public gatherings.
4. **Engage utility companies** - Work with private and public utility companies on creating and updating utility corridor management plans that recognize the importance of maintaining healthy wetlands, stream and river riparian buffers, and of reducing the use of chemical pesticides in or near these sensitive areas.
5. **Engage the public** - Engage with residents and others in the watershed on ecological issues, particularly with regard to recognizing that the streams, streambanks, and riparian areas, including riparian buffers and corridors, are sensitive places that might be conserved, restored, and protected.
6. **Pursue education opportunities** - Pursue opportunities to educate landowners, developers, and local land use boards about the causes of non-

point-source pollution, its potential impacts on water quality and instream resources, and methods—such as best management practices—for reducing or eliminating it. Pursue opportunities to demonstrate the use of best management practices such as expanding riparian native vegetation buffers to control non-point-source pollution.

7. **Engage school-aged children** – Work with local schools to conduct educational and recreational programs so children will learn about and understand the importance of the rivers to their communities. Champion the river as a classroom with "on-water education" and field trips to the rivers.
8. **Teach watershed science to teachers** - conduct courses for teachers in the use of the AWESome (ACTIVE WATERSHED EDUCATION) Curriculum.
9. **Teach watershed science to citizens** - Educate citizens about the geographic extent and functions of the rivers in the Wood-Pawcatuck Watershed, the specific needs for protection of and improvement to the rivers systems, and the benefits of a healthy watershed to individuals and communities.
10. **Promote stewardship** - Encourage the public to speak out on issues and to participate in the stewardship of the proposed designated area.
11. **Build an educational network** - Encourage organizations with existing education and outreach programs to continue and expand their efforts, through cooperation among those organizations. Develop methods to provide information and education about the Wood-Pawcatuck Watershed.

Cultural

Rivers are the life blood of the communities in the Wood-Pawcatuck Watershed. It is important to note that the Wild and Scenic Rivers designation is as much about celebrating the communities' ties to the rivers as it is about the rivers themselves. From pre-European times to today, residents and visitors in the watershed have shared an emotional and spiritual as well as practical connection to the rivers.

There are many examples of indigenous archeological sites throughout the watershed, particularly along the Wood, Pawcatuck and Green Fall Rivers. Extensive Native American ceremonial stonework can be seen throughout the river region, including Manitou hassunash, and hassuneutunk, the walls and serpent effigy of the Narragansett Indians. Landmarks in the watershed contain many names from the Narragansetts and Mashantucket Pequots, such as the Usquepaugh River.

Many watershed towns have villages named after the mills that were instrumental in their establishment. Remnants of these early mills are found throughout the

rivers today. Agriculture remains an important aspect of the watershed. The prime agricultural soils in the large floodplains along the banks of all seven rivers were historically significant to the founding of the first colonial towns and are still heavily utilized to this day.

Cultural Action Plan

A. Preserve and protect cultural resources

1. **Study our historical relationship with the rivers** - Encourage the Stewardship Council to work with representatives of the Narragansett and Pequot tribes to share information on their relationship with the rivers. Also work with historical societies, as well as other entities as appropriate, to undertake further research into the historical relationship between the adjacent communities and the rivers.
2. **Emphasize our connection with the rivers** - Develop materials and public programming to highlight the connection between the communities and the rivers and to foster increased appreciation.
3. **Consider economic benefits of historical-cultural focused tourism** - Consider doing an "economic benefits" analysis of historical-cultural focused tourism in the subject region, possibly in cooperation with Freedoms Way Heritage Association and regional planning commissions or others.
4. **Consider maintenance and restoration of sites** - Consider maintenance and restoration of historical and cultural sites.
5. **Protect historical and cultural character** - Raise awareness so that new development along the river corridors is compatible with the historical and cultural character of the surroundings and fully reflects the need to protect those amenities, including mill redevelopment.
6. **Protect traditional landscapes** - Protect traditional New England visual resources and landscape patterns typified by colonial mills along rivers. Support resource-based economic activities or "working landscapes" including sustainable farming, forestry, and ecotourism, in any way possible.
7. **Nominate historic sites** - Develop documentation leading to the nomination of historic sites as National Historic Landmarks, or for other state or local recognition.
8. **Protect prehistoric resources** – Work with the Narragansett and Mashantucket Pequot tribes to investigate and protect all major prehistoric resources.
9. **Consider interpretive signage** - Pursue suggestions in regards to interpretive signage of prehistoric and historic resources.

10. **Develop compatibly** - For any new development along the river corridors that towns have accepted, encourage compatibility with existing historic development.
11. **Address structural needs of dams** – Pursue opportunities for comment and input on structural issues surrounding dams.

B. Preserve and protect agriculture

1. **Preserve agricultural soil** - Protect prime agricultural soils in the large floodplains along the banks of the rivers, which were historically significant to the founding of the first colonial towns and are still utilized to this day.
2. **Preserve working farms** – Provide viable alternatives to farmers to keep their land in agricultural use. Payments for conservation easements on farmland encourage the continued use of agricultural practices while providing some much needed funding for the farmer.
3. **Encourage farming best management practices** – Provide educational opportunities and economic incentives to farmers to learn about and follow best management practices.
4. **Support alternative incomes for farming** such as farm stands, farmers markets, and events.
5. **Encourage a new generation of farmers** – Provide better access to information about grant programs, assistance and business development.
6. **Encourage the use of federal programs** –
    a. Environmental Quality Incentive Program: This program provides technical and financial assistance to landowners and operators of crop or livestock farms for planning and designing best management practices that protect the soil, air and water, increase soil productivity, enable care for farm animals, and manage waste produced on the farm.
    b. Wildlife Habitat Incentive Program: Technical and financial assistance is provided through this program for landowners who want to voluntarily improve wildlife habitat or restore ecosystems on their property.
    c. Wetland Reserve Program: This program provides assistance for the purchase of temporary or permanent easements on farmed wetlands for water supply protection and wildlife habitat and helps to restore farmed wetlands for wildlife habitat.

Scenic and Recreation

The Wood-Pawcatuck Watershed lies within an easy drive between the greater Boston metropolis region (population 4.7 million) and New York metropolis region (population 8.5 million). In Rhode Island alone, the watershed is an hour or less drive for over 1 million residents. Because the watershed is seventy percent forested, it creates a green oasis for urban dwellers to unwind and reconnect with nature. This makes the river-related recreational pursuits greatly valued throughout southern New England.

Scenic and Recreation Action Plan

A. Ensure healthy ecosystems to support recreational fisheries.

1. **Protect riparian land** - Keep riparian forests contiguous, so that their shade helps keep water temperature cool, allowing the water to hold more dissolved oxygen than warm water. Support and promote impervious surface reduction strategies within watersheds (narrower roads, porous pavements and surfaces that absorb runoff) to reduce stormwater runoff and water temperatures. Promote education and awareness, and changing of local subdivision and development codes.
2. **Protect water flow** - Maintain, protect, and enhance water flow regimes that support the habitat requirements of native river fauna, while accommodating demands for water supply, waste assimilation, commercial, industrial, and agricultural uses.
3. **Support native fish** - Work with local, state and federal partners to keep healthy populations of native brook trout and other native sport fish for recreational fishing.
4. **Support fish passage at dams** – Work with town, state, and federal agencies to identify appropriate projects that promote fish passage as well as working for the local communities.
5. **Balance multiple uses** - Promote dialogue regarding balancing multiple uses and avoidance of over-use resulting from increased public exposure on all the rivers in order to reduce potential conflicts. Continue to work with RI DEM, CT DEEP, and the Trail Advisory Committee and CT Greenways Council.
6. **Promote responsible angling** - Educate and encourage anglers about proper disposal of lures, weights and other fishing equipment including monofilament line.

B. Provide and maintain public boating access.

1. **Maintain existing access for boaters** - Maintain and, where possible, improve the current appropriate public access sites for boaters. This includes access points just for canoes and kayaks, as well as trailer launches for motor boats where appropriate.
2. **Support new access points** - Support creation of additional appropriate public access sites for canoe and kayak users, as well as trailer launches for motor boats where appropriate.
3. **Support handicapped access** - Support development of appropriate handicapped accessible sites.
4. **Consider boat access as part of road projects** - Consider requiring provision for appropriate public access when bridges or culverts (especially on state roads) are upgraded.
5. **Support water-based recreation planning** - Encourage the planning of water-based recreational opportunities. Encourage "blue trails" (waterway trails) and their canoe access sites, in connection with the Rhode Island Blueways Alliance and the Appalachian Mount Club chapters in Connecticut and Rhode Island.
6. **Improve parking and signage** - Encourage adequate parking and signage at existing and new sites. Work with state agencies and local communities to provide bathroom facilities at select public launches.
7. **Improve boating passage** - Improve rivers for safe boating passage by having regular maintenance to remove obstructions such as large woody material while maintaining habitat quality.
8. **Maintain stream flows** – Maintain or modify stream flows to maintain or enhance recreational and scenic qualities, while accommodating demands for water supply, waste assimilation, commercial, industrial, and agricultural uses.
9. **Encourage clean boating** - Educate boaters to make sure boat hulls are clean before putting in as a way to limit the spread of aquatic invasive "hitchhikers".
10. **Publicize paddle guides** - Publicize the Wood and Pawcatuck River Routes Guide to encourage boaters to select trips compatible with their skill level. Update as appropriate. Consider developing a smartphone app of this guide, which could eventually include other rivers in the watershed.
11. **Work with paddling groups** - Coordinate with regional paddling groups such as the Narragansett Chapter of the Appalachian Mountain Club (AMC), Rhode Island Canoe and Kayak Association, Southern New England Paddlers,

and local land trust groups, which organize numerous trips on rivers in the Wood-Pawcatuck Watershed.

C. Provide opportunities for hikers and walkers along the rivers.

1. **Practice trail stewardship** - Increase monitoring and maintenance of trails and river access areas. Minimize littering, parking problems, all-terrain vehicle abuses, vandalism, and trespassing on adjacent private lands. Encourage "Adopt-a-Trail"-style projects.
2. **Work with volunteer groups** - Maintain access to existing trails and provide information for trail users via coordination with local trail committees.
3. **Teach multi-use principles** - Help users of the various hiking trails learn how to safely navigate multiple types of concurrent use, for example horses, pedestrians, and cyclists simultaneously using the trails. Help users identify trails appropriate to their form of recreation.
4. **Publish trail guides** – Consider developing riverside trail guide books or maps, both print and online, to encourage use of hiking trails in the watershed and assist in exploration of such trails.
5. **Support regional trail groups** - Encourage the work of regional trail groups such as AMC Narragansett Chapter.
6. **Encourage universal accessibility** - Encourage Americans with Disabilities Act accessible trails and wildlife viewing areas where feasible.

D. Inform the public and be informed.

1. **Publicize the Wild and Scenic River program** - Provide Wild and Scenic River program information at community events, fairs, canoe races, fishing events and other public gatherings.
2. **Host a Wild and Scenic River event** - Consider developing a signature event, which would annually help further inform the public on the value of the rivers, their outstanding resources, the value of their designation as Wild and Scenic Rivers, and opportunities to engage in stewardship activities.
3. **Formalize pet policies** - Clarify appropriate recreational areas for dog owners. Reinforce or create pet waste ordinances (pooper-scooper laws) and restrictions on illegal dumping, or otherwise secure and maintain pet waste disposal containers.
4. **Engage public in nature-focused wildlife viewing and events** - Encourage continued public support and participation in a variety of active and passive learning programs involving the rivers.
5. **Be responsive to an existing and evolving variety of recreational interests** - Track new types of recreational activities and equipment that are

not foreseen today, to make sure they are compatible with managing and protecting our rivers' ORVs. For example, a decade ago the emergence of drone aircraft was not foreseen, but is a consideration today.

6. **Study economic benefits of recreation** - Consider analyzing the economic benefits of recreation in the proposed designated area, possibly in partnership with state and local tourism bureaus.

E. Recognize the importance of views from the rivers and help preserve them.

1. **Protect viewshed** - Encourage protection of traditional New England landscape patterns and scenic visual resources. This may include, for example, concerns regarding steep slopes, building heights, and outdoor lighting. Protect traditional New England landscape patterns and visual resources by supporting resource-based economic activities—"working landscapes"—including sustainable farming, forestry, and ecotourism.
2. **Assess exceptional views** - Consider conducting a formal scenic assessment of exceptional views (such as National Park Service's "Visual Resource Inventory") to identify resources in need of protection that also include views from on the rivers toward undeveloped shoreline banks. The forested corridor or greenway is a much appreciated aesthetic resource.
3. **Consider aesthetics in management plans** - Pay special attention to aesthetics, in addition to forest health, when first drafting Forest Management Plans along the rivers. The natural, "wild" appearance of open space is a key component of the special enjoyment the public derives on these rivers.
4. **Consider adopting scenic river provisions** - Protect the scenic and environmental integrity of the river by requiring structures to be integrated into the existing landscape to minimize its scenic and environmental impact.

Painted turtle in the Wood River (Photo credit: Thomas Tetzner)

CHAPTER 7: WORKING TOGETHER INTO THE FUTURE: Role of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Council

Wood-Pawcatuck Wild and Scenic Rivers Stewardship Council (WPWSRSC)

PURPOSE OF COUNCIL

- To provide a forum to prioritize, discuss, and resolve river and watershed issues across town and state lines.
- To implement the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and to periodically update the Plan.
- Coordinate with other stakeholders on implementation of Plan goals and actions.

MEMBERSHIP

Municipal members will be comprised of representatives from the twelve towns within the watershed.

Charlestown	Exeter	Hopkinton	North Kingstown
North Stonington	Richmond	South Kingstown	Sterling
Stonington	Voluntown	West Greenwich	Westerly

The Council is structured to allow one representative appointed by each town's legislative body. One alternate may also be appointed at the discretion of the town. Terms of appointment will be for two years, or as determined is necessary.

NOTE: The towns of Coventry and East Greenwich are also a part of the Wood-Pawcatuck Watershed, though were not participants in the Wild and Scenic Study Committee. Both towns should be offered membership on the Stewardship Council upon consideration and adoption of the Stewardship Plan by their town's legislative bodies.

Agency members –The CT DEEP and RI DEM will be asked to appoint a representative to provide support and assistance to the Stewardship Council. Alternates may be appointed at the discretion of the agencies' directors. The National Park Service will continue to provide guidance and support to the Council.

Other members - Non-profit conservation organizations – Wood-Pawcatuck Watershed Association, Save The Bay, The Nature Conservancy, Audubon Society of Rhode Island, Rhode Island Land Trust Council and Connecticut Land Conservation Council will be invited to appoint one representative each to serve on the Council. The Council may also decide to add other members from organizations that may help implement the Stewardship Plan.

Non-voting members such as the local land trust and conservation commissions may be invited to attend meetings or to serve on subcommittees.

STRUCTURE

The Council will develop their own by-laws to articulate the details of how they will function. The following is based on the structure of the Study Committee and can be used to assist the establishment of the Council.

Officers - The Council may elect officers, such as Chairperson, Vice Chairperson, Secretary, and Treasurer, from its town appointed members. Terms of appointment will be for two years, or as determined is necessary.
Meetings - Meetings shall be open to the public. In order to have a quorum, at least half of the towns (six, at this time) must have at least one representative present. The meetings will be conducted under Robert's Rules of Order. The Council shall maintain minutes and agendas in standard formats in a publicly accessible location.

Subcommittees - The Council may form subcommittees as needed. People who are not currently on the Council may be asked to serve on the subcommittees.

Other Council Activities - The Council will set its own budget, hire its own contractors, and approve dispersal of funds as appropriate.

VOTING

Each organizational member of the committee shall have one vote, including municipal and non-municipal members. To the extent that it is possible the Council will be encouraged to come to consensus on all issues.

FREQUENCY OF MEETINGS

The Council will meet at least bimonthly, or as often as it deems appropriate.

PLAN UPDATES

The Council shall formally revise the Stewardship Plan at least once every ten (10) years. A less formal update should occur no more than five (5) years from the date of the latest revision.

FUNDING/STAFF

When the rivers receive Wild and Scenic River designation then the National Park Service (NPS) will provide funding through the Partnership Wild and Scenic Rivers Program, subject to congressional appropriations. In addition to providing staff

support and/or direct financial assistance the NPS may provide technical planning and river conservation assistance to the Council if requested and if sufficient appropriations are available. WPWSRSC is encouraged to leverage any potential federal funding provided to maximize the impact of such funds. WPWSRSC may wish to pursue financial assistance and/or in-kind contributions from individuals, foundations, corporations, and government (federal, state, and/or local).

Cooperative Agreements are formal written agreements between NPS and a local partner to create the ability to distribute federal funding or other federal assistance for supporting the implementation of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan pursuant to Sec. 10(e) and/or Sec. 11(b)(1) of the Wild and Scenic Rivers Act. A local partner will be chosen from among the membership of the Stewardship Council to act as the fiscal agent for WPWSRC and NPS. This will likely be the Wood-Pawcatuck Watershed Association (WPWA) which is consistent with the conduct of the Study. Decisions on how funds are allocated, if they become available, remain with WPWSRSC in consultation with NPS.

It is anticipated that with the funding from NPS, WPWA will provide a Rivers Coordinator to serve the Stewardship Council, help implement stewardship projects, and conduct education and outreach. The Coordinator may be WPWA staff or an independent contractor. The Coordinator may NOT be the WPWA Executive Director, or one of its Board of Directors. The Coordinator's salary will be paid through the NPS funding. The Coordinator will answer to the Council. Hours and expenses for the Coordinator will be approved by the Council Chairperson.

wpwildrivers.org

Chipuxet River at Rt. 138 in South Kingstown, RI (Photo credit: Elise Torello)

Appendix A:

Summary of Federal, State, Municipal and Tribal Laws, Regulations, Ordinances and Plans

Wood-Pawcatuck Wild and Scenic Rivers Study

SUMMARY OF MUNICIPAL PLANS & ORDINANCES

WOOD-PAWCATUCK WILD AND SCENIC RIVERS STUDY

For the Towns of

Charlestown, Exeter, Hopkinton, North Kingstown,
Richmond, South Kingstown, West Greenwich, & Westerly, Rhode Island

And

North Stonington, Sterling, Stonington & Voluntown, Connecticut

April, 2018

Submitted to:
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
203 Arcadia Road
Hope Valley, RI 02832

Prepared by:
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771 Plainfield Pike
North Scituate, RI 02857

SUMMARY OF MUNICIPAL PLANS & ORDINANCES

SUMMARY OF MUNICIPAL PLANS & ORDINANCES

WOOD-PAWCATUCK WILD AND SCENIC RIVERS STUDY

1.0 Introduction

This report summarizes plans and regulations for twelve towns in the Wood-Pawcatuck Wild and Scenic Rivers Study area (Figure 1. Wood-Pawcatuck Watershed). As part of that study, the Wood-Pawcatuck Wild and Scenic Rivers Study Committee (WPWSRSC or Study Committee) is preparing "…a locally-based Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and a Study Report that describes the eligibility and suitability of a Partnership Wild and Scenic River designation for the Beaver, Chipuxet, Green Falls, Queen/Usquepaugh, Pawcatuck, Shunock, and Wood Rivers." (WPWSRSC, 2018). The Stewardship Plan will help to protect the Outstandingly Remarkable Values (ORVs) documented in the Study. The National Park Service (NPS) 2013 report "Wild and Scenic River Reconnaissance Survey of the Wood-Pawcatuck Watershed" sates (p.20):

> *An in-depth analysis is undertaken during a Wild and Scenic Study and includes an evaluation of:*
> - *The adequacy of local zoning and other land use controls in protecting the Wild and Scenic River value by preventing incompatible development. …*
> - *The state/local government's ability to manage and protect the Wild and Scenic River values on non-federal lands. In conducting this evaluation a study team will determine if the communities and state have existing zoning and land use controls adequate to protect the waterways and associated ORVs, or whether additional controls are necessary to protect resources. Essential programs or regulations, together with resource objectives and recommendations for future action, are documented in the comprehensive river management plan (CRMP) developed as a part of the Study. Partnership Wild and Scenic River (PWSR) designation under the WSRA is only suitable when there is strong, broad-based support for these critical elements as included in the Plan.* (NPS, 2013)

Federal and state laws provide significant protection to the rivers and provide a foundation for local protections as well; key federal and state laws are therefore described in this report. For each of the twelve member communities, this report provides a summary of community plans and municipal ordinances that relate to the use, protection, and/or management of the study rivers, and identifies potential areas for improvement.

In 2014 the U.S. congress enacted Public Law 113-291, adding the following rivers for study by the National Park Service (NPS) for potential designation as part of the National Wild and Scenic Rivers System pursuant to Section 2(a)(ii) of the National Wild and Scenic Rivers Act (PL 113-291, 2014):

- Beaver, Chipuxet, Pawcatuck, Queen, Wood, Usquepaugh

The Wood-Pawcatuck Wild and Scenic Rivers Study also includes the following rivers whose watersheds comprise the remainder of the larger Wood-Pawcatuck Watershed:

- Ashaway, Green Fall, Shunock

Currently, Rhode Island has no designated Wild and Scenic Rivers.

This report begins in Section 2 with a description of the methods used to collate and summarize the municipal information. The following Section 3 summarizes key federal, state and tribal laws and programs that directly or indirectly afford river protection. Section 4 provides a summary overview for all towns, including a summary matrix (Table 1) to facilitate comparison. The report concludes in Section 5 with a town by town summary of relevant plans and ordinances, including recommendations for each town for improved resource protection in the study area. Appendix A to this report is a separate document containing detailed information for each town.

2.0 Methods

The National Park Service Wild and Scenic River (WSR) Program guidance (NPS, 2018) was reviewed along with material provided by the Study Committee including information on ORVs identified for the study rivers, and examples of similar studies conducted for other Partnership Wild and Scenic River studies / stewardship plans (WPWSRSC, 2018). Each municipality's town plan, code of ordinances, zoning, and land development regulations were obtained and reviewed as they relate to the study river's corridor and watershed. Regulations that appear irrelevant to the study because of subject matter or relevance outside the study rivers' watersheds were not reviewed. Important federal and state laws are summarized in Section 3, including those which form the basis of regulations implemented at the state and local level. Common elements of most or all town's plans and regulations are summarized below in Section 4 by subject matter or category. Relevant portions of each town's plans and regulations are summarized by town in Section 5. Maps depicting zoning, future land use plans, conservation lands and water resource constraints were evaluated for the study river corridors and watersheds in each town, and the protections afforded to the watershed ORVs are summarized for each town. Recommendations related to local regulation are included for each town.

The review of town plans and regulations varies by town in accordance with the relevancy of the subject matter to the specific study river / watershed conditions in town. For example, Sterling and Voluntown each have significant river protection afforded by the Pachaug State Forest lands, and so land development regulations are not discussed in the same depth as for communities such as North Stonington or Westerly where future development has a greater potential to affect river ORVs.

3.0 Federal, State and Tribal Protection

Regulatory protection of rivers and watersheds is based on state, tribal, and in some cases federal plans, policies and laws. This section describes key regulations at the federal, state and tribal level that protect study rivers and associated Wood-Pawcatuck Watershed ORVs. Note that this section presents the regulations by statute or regulatory program; refer to the separate section of the Stewardship Plan that lists relevant plans and regulations by ORV. In some cases the regulations described below provide direct protection without significant local responsibility for implementation; in many cases the regulations delegate implementation to the municipal government (the National Flood Insurance Program, for example). In many instances the regulatory protections afforded to a particular resource involve multiple jurisdictions and authorities. This section begins with a brief listing of some of the more important federal laws, followed by descriptions of the protections afforded by the Narragansett Indian Tribe, the State of Rhode Island and the State of Connecticut.

3.1 **Federal Protection**

3.1.1 Wild and Scenic Rivers Act (WSRA)

The federal Wild and Scenic Rivers Act (Public Law 90-542; 16 U.S.C. 1271 et seq.) established the National Wild and Scenic Rivers System "… to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development." (USFWS, 2018). The act includes a process for the addition of new rivers to the National Wild and Scenic River System as referenced in Section 1 of this report. "Congress has specified in some Wild and Scenic River designations, that rivers are to be administered by the Secretary of the Interior through the NPS in partnership with local governments, councils, and non-governmental organizations, generally through the use of cooperative agreements. In these Partnership Wild and Scenic Rivers communities protect their own outstanding rivers and river-related resources through a collaborative approach." (NPS, 2018)

Once a river is accepted into the System, the WSRA affords those rivers additional protection in regard to federal activities.

> Section 11(b)(1): *The Secretary of the Interior, the Secretary of Agriculture, or the head of any Federal agency, shall assist, advise, and cooperate with States or their political subdivisions, landowners, private organizations, or individuals to plan, protect, and manage river resources. . . . This authority applies within or outside a federally administered area and applies to rivers which are components of the Wild and Scenic Rivers System . . .*

While the act includes similar mandates for federal agencies to assist, advise and cooperate with river management in furtherance of WSRA goals, specific standards for resource protection are not provided in the act. In practice specific resource protection by federal agencies pursuant to WSRA is realized through application of existing federal protections consistent with the river specific management plans.

3.1.2 National Environmental Policy Act (NEPA)

NEPA requires that all federal agencies consider the environmental impacts of their actions. Each federal agency has implementing regulations that are followed to ensure NEPA compliance. Major federal actions are reviewed before they are implemented, and if found to have a potential for significant impact, an environmental impact statement (EIS) must be prepared. Agency regulations may allow an environmental assessment (EA) to be prepared in cases where impacts are not as severe or may be reasonably lessened through impact mitigation. NEPA requires agencies to evaluate all reasonable alternatives to the proposed action, the impacts of these alternatives, and actions to avoid and mitigate foreseeable impacts. NEPA requires agencies to prepare EISs and EAs with input from other government entities and the public.

Major federal actions that may trigger an EIS or EA include expenditure of federal transportation funds, dredging a river or harbor, or funding of sewage treatment system improvements for example. Agencies generally have procedures in place to ensure that most of their projects are developed in a way that avoids significant impacts such that an EA or EIS is not required. For example, most federal highway drainage projects are done in a manner that qualifies them as a Categorical Exclusion (CE) pursuant to NEPA. It is important to understand that projects conducted by state agencies such as the Connecti-

cut Department of Transportation and the Rhode Island Department of Transportation receive major funds from the federal Department of Transportation and must therefore comply with NEPA.

3.1.3 Historic Preservation Act

Section 106 of the federal Historic Preservation Act requires that federal agencies consider the impacts of their actions on historical and archaeological resources. Whether officially designated or not, properties that are eligible for listing on the National Register of Historic Places are protected. Such resources must be at least 50 years old and must be in a condition that is deemed to have historic / cultural value. Federal actions that involve soil excavation must often consider the potential presence of archaeologic resources of cultural importance. Compliance with section 106 often involves a number of steps involving survey of protected resources, measures to avoid impacts to those resources, and if impacts are unavoidable, measures to recover and/or otherwise preserve the affected resource. Historic and archaeologic resources occur throughout the Wood-Pawcatuck Watershed; the rivers themselves are rich in these resources because of the importance of these rivers to all people who have lived in the area as well as the rivers' importance to regional trade and commerce.

3.1.4 National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides federally subsidized flood insurance to homeowners and businesses. To be eligible to participate in the program, a local government (municipality) must enact laws that restrict development in flood hazard areas. The delineation of flood hazard areas is done by the Federal Emergency Management Agency (FEMA) and published on Flood Insurance Rate Maps (FIRMs). FEMA also sets the regulatory requirements municipalities must enact. The regulations generally prohibit filling and new development in the 100-year floodplain and require buildings damaged by flood events to be rebuilt in a way that helps protects them from future flood events. A municipality that does not enforce the required flood hazard regulations may jeopardize the ability of individual homeowners and businesses in the community to obtain flood insurance. The local building official or zoning officer is typically empowered to administer flood hazard regulations at the local level.

3.1.5 Clean Water Act

The federal Clean Water Act (CWA) regulates many activities affecting the study rivers. It sets goals that waters of the United States should fishable and swimmable and generally suitable for public water supply. The most important CWA protections involve regulation of point source discharges of wastewater (municipal sewage, industrial pollutants, stormwater outfalls), non-point sources of pollution such as stormwater runoff from farms and urban areas, and the destruction of wetlands by filling. The CWA requires treatment of wastewater before discharge; funding of municipal sewage treatment plant construction and upgrade under the CWA was the largest public works expenditure in U.S. history. The U.S. Environmental Protection Agency (EPA) has primary authority for CWA implementation including the important role of setting water quality criteria and standards. Point source discharges are regulated pursuant to the National Pollutant Discharge Elimination System (NPDES). In the study area EPA has delegated NPDES authority to RIDEM (RIPDES program) in RI and to CTDEEP (Surface Water Discharge Permit Program) in CT.

Section 404 of the CWA gives primary authority over "filling waters of the U.S." to the U.S. Army Corps of Engineers (USACE), with EPA given significant oversight authority over the USACE. The Department of the Interior's U.S. Fish and Wildlife Service (USFWS), Department of Commerce National Oceanic and

Atmospheric Administration's National Marine Fisheries Service (NMFS) and the Department of Agriculture's Natural Resources Conservation Service (NRCS) have roles as key resource agencies in addition to EPA consulted by USACE in its 404 permit program. Wetlands, rivers and other waterbodies deemed "waters of the U.S." are regulated under section 404. In RI and CT the USACE has issued General Permits (Programmatic General Permits) that effectively allows each state to be the primary permitting authority for minor activities involving wetlands and waterways. In RI this permitting is conducted by RIDEM; in CT, the authority is carried out through local implementation of the CT Inland Wetlands and Watercourses Act. In both CT and RI the USACE retains the right to step in and regulate even small impacts to wetlands. The General Permits do not relieve the USACE of its responsibilities under NEPA or Section 106 of the Historic Preservation Act.

3.1.6 Safe Drinking Water Act

The federal Safe Drinking Water Act (42 U.S.C. 300f, 300h-3(e), Pub. L. 93-523) is intended to ensure safe potable water is available to the public. It sets specific water quality criteria and standards, and empowers EPA to administer implementing regulations. In 1988 the EPA designated the groundwater of the entire Pawcatuck Basin Aquifer System (entire Wood-Pawcatuck Watershed) as a "Sole Source Aquifer" because of its importance as the only source of drinking water available to the public (53 FR 17108).

> *The EPA defines a Sole Source Aquifer as one which supplies at least 50% of the drinking water consumed in the area overlying the aquifer. EPA guidelines also require that these areas have no alternative drinking water sources(s) which could physically, legally, and economically supply water to all who depend on the aquifer for drinking water.* (EPA, 2018).

This designation provides a higher level of protection of the groundwater from pollution with regard to federal activities (including federal regulations delegated to RI and CT). Within the Sole Source Aquifer area there may be:

> *… no commitment for federal financial assistance may be provided for any project which the EPA determines may contaminate the aquifer through its recharge area so as to create a significant hazard to public health.* (EPA, 2018)

3.1.7 Coastal Zone Management Act

The federal Coastal Zone Management Act (CZMA) of 1972 established the Coastal Zone Management Program and other programs intended to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." (NOAA, 2018). The Coastal Zone Management Program provides incentives for participating states to better manage their coastal zones through enactment of state coastal zone management programs. To be eligible for the federal incentives the state's program must meet certain minimum requirements but the state's program may go further in terms of jurisdictional area and resource protection. Incentives include federal funding for certain coastal management activities and a greater voice for the state in federal decision-making, among others. The minimum jurisdictional area required by CZMA includes the area of land within 200-feet of coastal waters.

3.1.8 CERCLA, RCRA, FIFRA, and TSCA

Environmental pollution from toxic chemicals lead to a number of federal laws in the 1970s and 1980s that regulate the use and disposal of toxic or otherwise hazardous chemicals. While the CWA focused largely on wastewater discharges to waterways, these other regulations focused on a) the use of chemicals in the workplace, home and environment, and b) the ultimate disposal of waste chemicals in the environment:

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund) – directs EPA to identify "orphaned" hazardous waste sites, direct their cleanup, identify "potentially responsible parties" (PRPs) and collect financial compensation from the PRPs to pay for the cleanup. There are no Superfund sites in the Wood-Pawcatuck Watershed. However, the related Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identifies a number of site remediation sites in the watershed, including old village manufacturing or industrial sites and closed dump sites. Both RIDEM and CTDEEP have primary authority for regulating site remediation and reuse.

Resource Conservation and Recovery Act (RCRA) – directs EPA to manage a permit program that requires businesses producing, using, and disposing hazardous chemicals to track the amounts and types of these chemicals "from cradle to grave", ensuring the responsible companies can account for proper use, shipment, and disposal of these chemicals. In the Wood-Pawcatuck Watershed RCRA is important as the primary regulatory authority at the federal level for chemical use and disposal by manufacturers and industries. Both RIDEM and CTDEEP incorporate federal RCRA requirements in their solid waste and hazardous waste regulations, and these state agencies are in practice the primary regulators of hazardous and non-hazardous waste materials in their respective states.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) – directs EPA to regulate pesticide use, including a requirement that all pesticides be registered after first demonstrating that proper use of the pesticide "will not generally cause unreasonable adverse effects on the environment.'' (EPA, 2018). FIFRA is important in the Wood-Pawcatuck Watershed as it relates to pesticide use for agriculture, residential lawns & yards, transportation and utility corridor control of vegetation, and control of nuisance plants / invasive plants in terrestrial and aquatic habitats. RIDEM and CTDEEP incorporate FIFRA requirements in their regulatory programs.

Toxic Substances Control Act (TSCA) as amended by the Frank R. Lautenberg Chemical Safety for the 21st Century Act – authorizes EPA to "…to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures." (EPA, 2018). TSCA does not regulate pesticides but has similar provisions to FIFRA for non-pesticide toxic chemicals. TSCA regulates "new" chemicals and the import / export of toxic chemicals. EPA has TSCA programs related to lead paint, polychlorinated biphenyls (PCBs), and asbestos in schools. In the Wood-Pawcatuck Watershed, TSCA is perhaps most relevant as a potential source of EPA grants for cleanup of old mills / other historic buildings.

3.1.9 Endangered Species Act

The federal Endangered Species Act (ESA) authorizes USFWS and NMFS to identify endangered and threatened species, and species of concern, and implement regulations to protect those species. USFWS manages ESA with regard to terrestrial and freshwater species while NMFS manages ESA with re-

gard to marine and anadromous species. Pursuant to ESA, the "taking" (destruction, collection, transport) of listed species is a felony crime. Any federal activity potentially affecting listed species must be evaluated pursuant to section 7 of ESA, and federal actions which may lead to "taking" of a listed species may not be authorized.

3.2 Narragansett Indian Tribe

The Narragansett Indian Tribe (NIT) is a sovereign nation with federally recognized tribal lands adjacent to the Pawcatuck River and extending southward to the Route 1. These tribal lands include important water resources such as Indian Cedar Swamp and Schoolhouse Pond, and are known to support a number of different rare species and habitats. The NIT tribal land overlies one of the largest groundwater reservoirs (high yield aquifers) in the region. While the designated tribal lands are certainly rich in cultural resources associated with the Narragansett Indian Tribe and their ancestors, such resources are extensive throughout the Wood-Pawcatuck Watershed. Protection of natural and cultural resources is a priority for the NIT. The Tribe is governed by the Chief Sachem and Tribal Council. Resource protection is provided by the NIT's Department of Community Planning and Natural Resources, and the Narragansett Indian Tribal Historic Preservation Office (NITHPO).

3.2.1 Department of Community Planning and Natural Resources

> *The Department of Community Planning and Natural Resources provides coordinated assessment and servicing of the Narragansett Indian Tribal Reservation and Tribal Community. The mission of the department is to promote sustainable community development and ecological functions, and to expand the Tribe's capacity to exercise its sovereign rights, through planning, analysis, education, and implementation. The goals of the department are to develop a sound economic base that will lead the Tribe to a future of self-sufficiency and enable the Tribe to continue providing services if funding from the federal government should decline or cease. The Planning Department develops ways to facilitate economic development and helps to envision future development of the Reservation lands, while being mindful of the need to protect natural resources and traditional Native American values.* (NIT, 2018)

> *Environmental Protection and Natural Resources Management is committed to protecting the health and welfare of the Tribal culture, Community, and the natural environment by preserving, conserving, restoring, and enhancing the Reservation environment through the collection and analysis of high quality natural resource data and facilitating environmentally sound resource management, planning, policy development, and community outreach. The program is also committed to the protection of the environment and human health on the Narragansett Indian Reservation through management and regulation of use activities. Programs include: indoor and outdoor air quality, non-point source pollution, management and clean-up of solid and hazardous waste, planning for hazardous incident response, emergency response, Hazard Mitigation and Planning, control of invasive species, Safe Drinking Water, wetland protection and regulation, habitat restoration, habitat management, shoreline study, sensitive areas and other natural resources, environmental ordinance and policy development and environmental review. The programs identified are funded through the Bureau of Indian Affairs and the Environmental Protection Agency.* (NIT, 2018)

3.2.2 Narragansett Indian Tribal Historic Preservation Office

> *The Narragansett Indian Tribal Historic Preservation Office (NITHPO) is a designated office of the Narragansett Indian Tribe. NITHPO is authorized to determine all matters on behalf of the Tribe with respect to historic preservation, Indian graves' protection, and religious freedom and other relevant cultural matters. … NITHPO and the Tribe as a whole, view archaeological site[s]… not as finite, fragile, and non-renewable cultural resources. Any study or construction project that involves the excavation of sediments or the alteration of a resource produces an irreversible effect on the area…. Performance standards and procedures are administered by … [NITHPO] to ensure that archaeological studies are done properly and do not inadvertently result in the loss of cultural resources through excavation or the removal of unearthed cultural materials. … [T] he National Historic Preservation Act that requires federal or state agencies to consult federally recognized tribes when a project might impinge on a historic site … enables the Tribe's Historic Preservation Office to consult with the Rhode Island State Historic Preservation Officer (SHPO), as well as state and federal agencies concerning proposed activities that may affect properties of traditional religious and cultural importance to the Narragansett Indian Tribe.* (NIT, 2018).

3.3 State of Rhode Island

Rhode Island has many resource protection laws, policies and programs similar to other states and often developed in conformance with federal laws. These are summarized below along with those which are somewhat unique to RI. Statutes are referenced with respect to the RI General Laws (RIGL). Unlike CT, regulation of wetlands and onsite wastewater treatment systems (OWTSs, also known as septic systems) is done by RIDEM at the state level rather than at the local level as in neighboring states. State enabling legislation related to planning and zoning requires implementation at the local level in conformance with state Guide Plans and procedures.

3.3.1 Comprehensive Community Plans

In Rhode Island Comprehensive Community Plans (Comprehensive Plans, or "Comp Plans") must be prepared by municipalities in conformance with the RI Comprehensive Planning and Land Use Regulation Act (RIGL 45-22.2) and associated regulations and guidance from the RI Department of Administration Division of Statewide Planning (RIDSP, 2018). The local Planning Board / Commission has the lead role in preparing the plan which must them be adopted by the town or city council.

> *Rhode Island has a reciprocal system of land use planning whereby the State sets broad goals and policies through the State Guide Plan and municipalities express local desires and conditions through the development of community comprehensive plans. These local comprehensive plans serve as the basis for land use regulation and establish an implementation program for achieving each community's stated goals. The local comprehensive plans are reviewed by the State, and when approved, become binding on State agencies by requiring conformance of their programs and projects to the comprehensive plan.* (RIDSP, 2018)

State law requires the municipality's zoning map and ordinance be consistent with the Comprehensive Plan. Required contents of the plans are specified in state "Comprehensive Planning Standards Manual" and associated guidebooks. This manual identifies the various State Guide Plan elements the RIDSP will use to evaluate Comprehensive Plan consistency with state plans and policies. The State Guide Plan elements are (RIDSP, 2018):

121: Land Use 2025: Rhode Island's State Land Use Policies and Plan

131: Cultural Heritage and Land Management Plan for the Blackstone River Valley National Heritage Corridor

140: State Historical Preservation Plan

152: Ocean State Outdoors:State Comprehensive Outdoor Recreation Plan

155: A Greener Path: Greenspace & Greenways for Rhode Island's Future

156: Urban & Community Forest Plan

161: Forest Resources Management Plan

421: State Housing Plan

423: Rhode Island Five Year Strategic Housing Plan: 2006-2010 - Five Thousand in Five Years

611: Transportation 2035: Long Range Transportation Plan

640: State Airport System Plan

651: Waterborne Passenger Transportation Plan

661: State Rail Plan

721: Rhode Island Water 2030

Energy 2035, Rhode Island State Energy Plan

RI Rising, Economic Development

Solid Waste 2038

Water Quality 2035

3.3.2 Zoning and Land Development

State zoning enabling legislation is codified in RIGL 45-24. The law establishes the procedures and standards for the establishment of local zoning districts, maps, ordinance, and administration. Local Zoning Boards and Zoning Enforcement Officers have principal roles in the enforcement of zoning. The local Planning Board / Commission also has a key role in administration of the local zoning regulations. Section 45-24-33 requires zoning to conform to the approved Comprehensive Plan. Most of the state zoning law is concerned with establishing the uniform content, structure of the ordinance as well as the land development review / approval process of the ordinance.

The Rhode Island Land Development and Subdivision Review Enabling Act (RIGL 45-23) establishes the requirements for local ordinances regulating subdivision of land and major land development project. It sets the required content of the ordinance and the procedures for review and standards for approval of proposed development projects. It includes provisions for establishing design standards, stages of

plan review/approval, project phasing, and the dedication of open space and other public amenities and infrastructure. These regulations are administered by a member of the Planning Board or other municipal designate; the review process is conducted by the Planning Board with consultation provided by town officials and boards including the Conservation Commission; appeals are heard by the Zoning Board.

3.3.3 Freshwater Wetlands

The Rhode Island Freshwater Wetlands Act of 1971 authorized RIDEM to preserve and regulate the freshwater wetlands of the state for the public benefits that they provide. This act stated that freshwater wetlands in the vicinity of the coast are regulated by the CRMC (the jurisdictional boundary between RIDEM and CRMC regulation of freshwater wetlands was revised in the 1997 Aquaculture Act). In December 2015 the Freshwater Wetlands Act was substantially revised / replaced (RIGL 2-1-18 through 2-1-28); once the implementing regulations are promulgated the new act will increase the jurisdictional area regulated by RIDEM and CRMC but will limit municipal authority to regulate certain activities with respect to wetlands.

Under the current regulations all wetlands, floodplains and surface waters (rivers, streams, ponds, lakes) are regulated; upland areas adjacent to certain types of wetlands are also regulated: 200-feet on each side of watercourses averaging 10-feet or more in width, 100-feet on each side of flowing bodies of water less than 10-feet in width, and 50-feet outside of certain types of wetlands such as bogs, marshes and swamps. Small isolated wetlands including vernal pools have no jurisdictional "buffer area" under current regulations. The 2015 statute increases the jurisdictional areas to 200-feet on each side of any stream or river (regardless of width), and 100-feet outside of all other wetlands except floodplains.

Wetlands are identified by soils, vegetation and hydrology and projects are encouraged to avoid, minimize and mitigate wetlands impacts. Some projects include construction of replacement wetlands but 1:1 replacement by area is not normally required. Rhode Island communities are allowed (at least at present) to administer their own wetlands regulations in existence prior to the new wetland statute (12/2015), but their jurisdiction is limited by the state.

3.3.4 Groundwater Protection

Groundwater protection regulations in RI are contained in "Rules and Regulations for Groundwater Quality"(7/26/10). These regulations provide the basis for the RIDEM Groundwater Standards and Classification Program, Onsite Wastewater Treatment System (OWTS) Program, and the Groundwater Discharge Program. Additional regulations are contained in "Groundwater Discharge Rules" (11/19/14). The regulations provide for compliance with federal requirements pursuant to the SDWA and CWA with respect to groundwater. They also include provisions for compliance with EPA's Sole Source Aquifer designations and requirements. Private and public wells are also regulated by RIDEM under these regulations; the RI Department of Health also has a role in the implementation of RI's groundwater protection strategy. RIDEM works with USGS to identify wellhead protection areas, groundwater reservoirs and associated recharge areas.

The OWTS Program provides for permitting of wastewater treatment systems serving individual homes and businesses as well as small community systems discharging treated wastewater to the ground. Specific OWTS regulations are contained in "Rules Establishing Minimum Standards Relating to Loca-

tion, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems" (6/27/16)

> *Permitting activities* [for OWTS] *are divided into three main stages: site-suitability, design review, and construction inspection. Site-suitability is a preliminary stage which assesses the suitability of a parcel of land for on-site sewage disposal. Design review entails a review to determine a design's compliance with State standards, rules and regulations including setbacks to drinking water wells, water supplies, and sensitive water bodies. Proper design and installation is essential to protect public health and avert the potential adverse impacts of onsite wastewater treatment systems on water resources.* (RIDEM, 2018)

"The Groundwater Discharge Program plays a role in the protection of these underground sources of drinking water by regulating the discharge to or above the ground surface of commercial and industrial wastewater and other fluids that have the potential to contaminate the State's groundwater resources." (RIDEM, 2018).

3.3.5 Wastewater Discharge Permits

Wastewater discharges to surface waters are regulated by the RIDEM RI Pollutant Discharge Elimination System (RIPDES) Program pursuant to its delegated authority under the federal CWA and RIDEM's "Regulations for the Rhode Island Pollutant Discharge Elimination System" (2/25/03) and RIDEM's "Water Quality Regulations" (12/28/10). The RIPDES program issues permits for surface water discharges of treated sewage from publically owned wastewater treatment facilities (sewage treatment plants), commercial and industrial wastewater, and stormwater from various activities. RIPDES administers discharge permits for large municipal stormwater collection systems (MS4 communities) as well as issuing general permits with requirements for managing stormwater during construction activities, industrial areas, and other activities with specialized requirements.

3.3.6 Coastal Zone Management

Rhode Island's designated CZM authority is the RI Coastal Resources Management Council (CRMC). This agency regulates development in jurisdictional areas with a permit program in compliance with the "Coastal Resources Management Plan" (CRMP) regulations. Activities within 200-feet of any "shoreline feature" (coastal feature) such as beaches, rocky shores, coastal bluffs and coastal wetlands are regulated. Freshwater wetlands contiguous with tidal wetlands are also considered a Coastal Wetland shoreline feature. CRMC also regulates freshwater wetlands in the vicinity of the coast (as noted above), certain large projects in coastal communities (e.g. power plants), and aquaculture projects even if they are proposed outside of the coastal zone.
The CRMP defines uses that are prohibited in coastal waters and on shoreline features depending on the water classification established in the CRMP. Shore areas classified for commercial / industrial uses allow more uses and have fewer restrictions that shore areas adjacent to waters classified for conservation uses. The CRMP specifies the type of permit required for allowed uses depending on the water type classification. A Category A Assent is typically issued administratively by CRMC staff while Category B applications are decided by the full Coastal Resources Management Council – a quasi-judicial council made up of members appointed or specified by the statute.

In some areas of RI CRMC has an additional set of requirements associated with a Special Area Management Plan (SAMP). In the project area CRMC has a SAMP for the Pawcatuck River Estuary and Little Narragansett Bay (Dillingham, 1992); it was created for the benefit of having a sole management plan

that would aid in governing the multiple agencies involved, those being primarily the CT DEEP and RI CRMC. The plans' goal has been to unify differences between the two states regulations for protection and maintenance of the Pawcatuck River Watershed and its corresponding habitats. Additional controls on nonpoint pollution, stormwater, septic and sewer systems, freshwater withdrawals and discharges were made with this plan. This was an early SAMP adopted by CRMC and the precise spatial boundaries of its jurisdiction are not clear.

3.4 State of Connecticut

Connecticut's resource protection laws, policies and programs are similar to those in other states and are often developed in conformance with federal laws. These are summarized below along with those which are somewhat unique to CT. Statutory reference is made to the Connecticut General Statutes (CGS) and regulatory reference is made to the Regulations of Connecticut State Agencies (RCSA). Unlike RI, Connecticut has a formal permit program for the diversion of groundwater or surface water at a rate of 50,000 gallons per day (gpd) or more. Connecticut's Natural Diversity Data Base program has a formal process for reviewing potential impacts to rare species and their habitats, unlike Rhode Island's program. The CT coastal zone jurisdictional area extends 1,000-feet landward of tidal waters and wetlands; this is significantly larger than the RI 200-foot CRMC jurisdictional area. State enabling legislation related to planning and zoning requires implementation at the municipal level in conformance with state guidance and procedures.

3.4.1 Municipal Plan of Conservation and Development

Community planning in Connecticut is guided by CGS Section 8-23 and administered by the Connecticut Office of Policy and Management (OPM):

> *Section 8-23 of the Connecticut General Statutes (CGS), as amended by Public Act 15-95, sets forth required procedures by which each municipality must prepare or amend and adopt a plan of conservation and development (POCD). ... [A]ny municipality that does not adopt a POCD at least once every ten years shall be ineligible for discretionary state funding unless such prohibition is expressly waived by the OPM Secretary. The 10-year clock for discretionary state funding eligibility re-sets whenever the municipal POCD is prepared or amended and adopted in accordance with CGS Section 8-23.* (OPM, 2018)

To be eligible for discretionary funding the municipality must provide a copy of the POCD to OPM, certify the POCD adoption date by the planning and zoning commission, and describe any inconsistencies between the POCD and the current State Plan of Conservation and Development.

3.4.2 Planning and Zoning

The statutes related to municipal planning and zoning are numerous and contained in various parts of the CGS. While OPM periodically publishes a "Compendium of Planning and Zoning Statutes", current requirements can only be determined by consulting the CGS (OPM, 2005). Some of the most relevant statutes related to WSR planning and zoning are contained in CGS:

- Title 7, Chapter 97a Historic Districts and Historic Properties
- Title 8 Zoning, Planning, Housing, Economic And Community Development And Human Resources, Chapter 124 Zoning

- Title 8, Chapter 125a Local Land Use Ordinances
- Title 8, Chapter 126 Municipal Planning Commissions
- Title 13a Highways and Bridges, Part IV Land Acquisition and Disposal
- Title 13b Transportation, Chapter 242 Transportation Department, Part V Waterways, Harbor Improvement Agencies
- Title 15 Navigation And Aeronautics Chapter 263 Harbors and Rivers
- Title 16a Planning and Energy Policy, Chapter 297 Connecticut's Development and Future, Part I State Plan of Conservation and Development
- Title 22a Environmental Protection (various chapters some of which are described below by specific resource). Particular chapters of note are:
    - Ch. 440 Wetlands and Watercourses
    - Ch. 444 Coastal Management
    - Ch. 444a Harbor Management Commissions
    - Ch. 445 Hazardous Waste
    - Ch. 446d and 446e Solid Waste
    - Ch. 446h Soil Conservation
    - Ch. 446i Water Resources
    - Ch. 446j Dams and reservoirs
- Title 23 Parks, Forests and Public Shade Trees
- Title 25 Water Resources. Flood and Erosion Control (various chapters some of which are described below by specific resource). Notable chapters include:
    - Ch. 476a Flood Management
    - Ch. 477d River Protection (model river protection ordinance)
    - Ch. 484 Protected Rivers
    - Ch. 485 Multiple Use Rivers

3.4.3 Environmental Policy Act

"The purpose of the Connecticut Environmental Policy Act (CEPA) is to identify and evaluate the impacts of proposed state actions which may significantly affect the environment. This evaluation provides the decision maker with information necessary for deciding whether or not to proceed with the project. The process also provides opportunity for public review and comment." (OPM, 2018) CGS Sections 22a-1 through 22a-1h, RCSA c. 22a-la-1 through 22a-la-12. CEPA is similar to NEPA but applies to state actions. CEPA requires state agencies to develop Environmental Classification Documents that help to identify that agencies actions which will likely require further evaluation in an Environmental Impact Report (EIR).

3.4.4 River Corridor Protection

The River Protection Act (CGS Section 25-200 to 25-206) and the Multiple Use Rivers Act (CGS Section 25-230 to 25-236) provide procedures for the establishment of river commissions, preparation and approval of river corridor management plans and management of river corridors by municipalities. DEEP oversees review and approval of plans by the state. Planning includes inventory, mapping, regulatory review and requires consultation with various agencies and the public; adopted River Corridor Management Plans must also be in conformance with the town(s) POCD(s). An approved plan requires local and state agencies to conform with plan provisions and allows the municipality to acquire lands in the corridor for preservation. DEEP greenways include river corridors designated pursuant to these acts. Many of the provisions of these acts parallel the WSRA and it appears these laws will govern the Con-

necticut municipalities' implementation of the Wood-Pawcatuck Wild and Scenic River Stewardship Plan.

3.4.5 Inland Wetlands and Watercourses

Connecticut's Inland Wetlands and Watercourses Act (IWWA; C.G.S 22a-36-45) requires each town to establish a municipal inland wetland agency to regulate activities that affect inland wetlands and watercourses within their municipal boundaries. These activities, referred to as "regulated activities," are those proposed or conducted by all persons other than state agencies. State agency actions are solely regulated by the Connecticut Department of Energy and Environmental Protection (DEEP). Inland wetlands in the state of Connecticut are defined by their soil type being hydric. Generally, watercourses are defined in Sec. 22a-38 as "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon this state or any portion thereof, not regulated pursuant to sections 22a-28 to 22a-35" (CT, 2018). A minimum 100-foot jurisdictional area extending outward from the edge of wetlands and watercourses, described as an upland review area, is set forth by the DEEP and accepted by all municipalities in the state. This upland review area, or a portion of it, may be designated as a buffer area to minimize wetland impacts. Individual municipalities may extend this buffer further through adopted town ordinances.

3.4.6 Water Diversion

Connecticut's regulates withdrawal and alteration of waters in the state through the Water Diversion Program . The program issues permits both on a general and individual level which follow the regulations set out in the Water Diversion Policy Act. (CGS 22a-365-379 and RCSA Sections 22a-372-1, 22a-377(b)-1 and 22a-377(c)-1 to 22a-377(c)-2). One must obtain a permit if they propose to:

- withdraw groundwater or surface water in excess of 50,000 gallons of per day;
- collect and discharge runoff, including storm water drainage, from a watershed area greater than 100 acres;
- transfer water from one public water supply distribution system or service area to another where the combined maximum withdrawal from any source supplying interconnection exceeds fifty thousand (50,000) gallons during any twenty-four hour period;
- expand a registered public water supply service beyond a service area as identified (1) within registration documents, (2) in a water supply plan submitted prior to October 1, 2016, or (3) beyond an exclusive service area identified on the Department of Public Health's 2016 withdraw groundwater or surface water in excess of 50,000 gallons of per day;
- relocate, retain, detain, bypass, channelize, pipe, culvert, ditch, drain, fill, excavate, dredge, dam, impound, dike, or enlarge waters of the state with a contributing watershed area greater than 100 acres;
- transfer water from one water supply distribution system to another in excess of 50,000 gallons per day;
- or modify a registered diversion.

Holders of such permits must annually file water diversion reports to the DEEP Water Planning and Management Division. Since the a portion of the Wood-Pawcatuck Watershed lies within the eastern public water supply management area in Connecticut, this diversion program aids in maintaining proper water levels and base flow important to maintaining fish, wildlife and recreational values.

3.4.7 Aquifer Protection

Groundwater sources in Connecticut are protected through the state's Aquifer Protection Area Program and Aquifer Protection Area statutes (CGS 22a-354a-bb) administered by DEEP. These statutes authorize municipal regulation of aquifer protection including creation of an agency, adoption of local regulations, appeals, and penalties. DEEP Level A mapping deems which wellfields in municipalities are to be regulated by law (RCSA 22a-354b-1). Level B mapping or "preliminary" mapping, does not act as a final area to be regulated for the protection program but instead offers general information on the location and size of the wells in municipalities. Zoning districts and APA's are separate in regulations. The DEEP, municipalities, and water companies all serve a role in carrying out the goals of the program and following the laws. While the DEEP provides overall program administration, municipalities have primary responsibility for implementing the land use regulations within the protection areas. Both Stonington and North Stonington have groundwater protection overlay districts and associated aquifer protection regulations. North Stonington has a mapped Level A aquifer on the Shunock River west of the Village of North Stonington.

3.4.8 Wastewater Discharge Permits

DEEP "regulates discharges to waters of the state, including all surface waters, ground waters and Publicly Owned Treatment Works (POTW) (i.e., sewage treatment plants)" through its water discharge permit program (CGS Sections 22a-416 through 22a-438; RCSA Sections 22a-430-1 through 22a-430-7).

> *DEEP uses both individual and general permits to regulate discharge activities. Individual permits are issued directly to an applicant, whereas general permits are permits issued to authorize similar minor activities by one or more applicants.*
>
> *DEEP issues discharge permits in three major categories. While the process for each is similar, specific application requirements may vary.*
>
> - *The Surface Water Discharge Permit Program, also known as the National Pollutant Discharge Elimination System (NPDES) under federal law, regulates discharges into surface waters (either directly or through municipal storm sewer drainage systems, or through other drainage systems such as wetlands or swales).*
> - *The Ground Water Discharge Permit Program regulates discharges to ground water from any source, including but not limited to large septic systems, agricultural waste management systems, and all waste landfills.*
> - *The Pre-treatment Permit Program regulates discharges to a sewage treatment plant through municipal sanitary sewer drainage systems, or through combined storm and sanitary sewer systems.* (DEEP, 2018)

3.4.9 CT Endangered Species Act

"The Connecticut Endangered Species Act, passed in 1989, recognizes the importance of our state's plant and animal populations and the need to protect them from threats that could lead to their extinction. The overall goal of the legislation is to conserve, protect, restore and enhance any endangered or threatened species and their essential habitat. Species are listed according to their level of risk, and their status is reviewed every five years." (DEEP, 2018) CGS Section 26-303.

Projects requiring state approval are screened for potential impacts by using the Natural Diversity Data Base (NDDB) maps; applicants for projects with a potential to affect mapped species / habitats file an application to DEEP's NDDB program for project review. Rare species surveys and impact evaluation may be required and may result in requirements to avoid and/or minimize potential impacts to the listed species.

3.4.10 Coastal Management

Connecticut's Coastal Management Act (C.G.S. 22a90 – 22a-112) provides for state and municipal regulation of work in coastal / tidal waters, tidal wetlands, and associated navigable waters. Development on the shoreline of Connecticut is regulated at the local level by zoning and planning boards/commissions that follow the policies of the Coastal Management Act. Boundaries set by the Act for coastal areas are defined in Sec. 22a-94 by either: the interior contour elevation of the 100-year flood coastal zone, a one thousand foot linear setback measured from the mean high water mark in coastal waters, or a one thousand foot linear setback measured from the inland boundary of tidal wetlands mapped under section 22a-20, whichever is farthest inland. Actions and decisions made by the administrative authority of the Act, the DEEP, are further approved by NOAA (National Oceanic and Atmospheric Administration) under the federal Coastal Zone Management Act. Coastal zones within Connecticut are also protected with the Coastal Nonpoint Source Pollution Program through the Section 6217 of the Coastal Zone Management Act Reauthorization Amendments of 1990.
Also consistent with the Connecticut Coastal Management Act is the Coastal Permit Program that regulates activities in tidal wetlands and coastal/ navigable waters under the Structures, Dredging and Fill Act (CGS 22a-359 - 22a-363f) and the Tidal Wetlands Act (CGS 22a-28 - 22a-35). This program is administrated by the DEEP Land and Water Resources Division.

4.0 Summary Overview of All Towns

This section summarizes the major regulatory and plan elements of resource protection in the subject towns. It is organized by major element: community plans, zoning, land development regulations, and special resource protection. For all towns these elements are interrelated, but the exact substance and interrelationships of regulations and plans varies by town and state. If protection for a special resource is contained in the zoning ordinance it will first be described in the zoning section for that town (groundwater protection districts, for example). In many towns, the zoning ordinance, land development / subdivision regulations, and some resource ordinances are provided separate and apart from the main code of ordinances. Not all towns have updated their plans and regulations, and sometimes internal inconsistencies exist.

4.1 Community Plans

All towns in the study area have some sort of master plan to guide growth and development in the future. Both Rhode Island and Connecticut have state laws that govern the preparation and content of such plans. Both states provide financial support to towns for plan preparation. In Rhode Island, these plans are called Comprehensive Community Plans (Comprehensive Plans, or "Comp Plans"). In Rhode Island these local plans must be prepared in conformance with the RI Comprehensive Planning and Land Use Regulation Act (RIGL 45-22.2) and associated regulations and guidance from the RI Department of Administration Division of Statewide Planning (RIDSP, 2018). In Connecticut, this plan is typically called the Plan of Conservation and Development (POCD). Those local plans are guided by the State of Connecticut 2013-2018 Conservation and Development Policies Plan (OPM, 2013), in accordance with state law (CGS 8-23). In both states, towns may have supplemental or associated plans that focus on an important community planning element such as open space or economic development. Such supplemental or related plans are described below to the extent they are relevant to resource use or protection in the study area.

All of the towns include goals promoting the preservation of natural resources, open space, and the rural / historic character of the town. In most cases these preservation goals are tied to water supply protection, protection of development from flood damage, and for some towns the protection and promotion of the tourism industry. Towns also recognize the importance of resource protection for financial sustainability, understanding the loss or diminishment of certain resources may pose adverse financial consequences to the town. All towns protect the study river corridors to a large extent, and provide meaningful development regulations that protect water resources in the river's watersheds. Many towns promote greenways and interconnected conservation lands; some towns specifically support the Wood-Pawcatuck Wild and Scenic River Study effort.

4.2 Zoning

All of the towns in the study area also have enacted zoning ordinances that place controls on land uses to protect public health safety and general welfare. Because they must be consistent with state enabling legislation (which is, in turn, based on federal model legislation) the ordinances all tend to be very similar in form, even though there is a wide variation in the types of zones established and the types of uses allowed. Zoning ordinances typically consist of two parts. The first part is the text. The text establishes zoning districts and indicates which uses are allowed within each district. Other common parts of the text include:

- Legal Authority, and Purpose
- General Provisions
- Zoning Districts and Regulations
- Use Tables
- Dimensional Requirements
- Nonconforming Uses, Structures, and Lots
- Impact Standards, Performance Standards, Review/Approval Criteria
- Administration, Enforcement and Appeals
- Amendment Procedures

The second part of the Zoning Ordinance is the Zoning Map. The Zoning Map shows the locations of the various zoning districts within the town. This analysis concentrates first and foremost on the types of zones designated in proximity to the study rivers with an eye to evaluating the level of resource protection provided by the Ordinance. Protection of watershed ORVs is also described. In addition, many communities include "overlay" districts that provide a higher level of resource protection than the underlying district. Typical overlay districts within the study area include aquifer and groundwater protection zones, wellhead protection areas, flood hazard zones, historic village districts and occasionally wetland and riverfront protection zones. Some overlay zones are explicitly mapped, others are incorporated by reference to specific maps such as the local Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs).

Finally, some zoning ordinances include special measures that allow proposed developments to be configured in such a way as to protect natural resources while still providing the same development densities as conventional development. These allow uses to be arranged on one part of a property at higher densities while leaving other parts of the property undeveloped to protect open space, agricultural land, historical resources, wetlands, floodplains and other valuable natural resources. Examples include residential compounds, cluster development ordinances, and Planned Unit Developments (PUD). The terms "Conservation Development" and "Low Impact Development" (LID) are also referenced in zoning and land development regulations, but often with different meanings and specificity in different towns.

In each case, the Zoning Ordinance also establishes a Zoning Board of Review or Zoning Board of Appeal. The responsibility of the Zoning Board is to hear cases where the literal application of the Ordinance would result in a "hardship" for an individual property owner and/or would deprive a property owner of all reasonable use of the land. The Board is empowered to grant variances in those cases assuming the conditions for "relief" have been met. Most Zoning Boards also grant Special Use Permits for uses where special conditions must be met as a pre-requisite to development. They also hear appeals of decisions made by the Planning Board / Planning and Zoning Commission in the development review process described below.

Town zoning provides very good protection of study river corridors for the most part, especially in combination with large areas of protected conservation lands. Many of the zoning challenges with respect to resource protection are a result of the historic village developments along the river. While these villages are an important asset to the cultural and scenic values of the rivers, they often pose challenges to new growth and redevelopment because of lot densities and inadequate infrastructure (wastewater disposal and water supply, for example) in addition to the historic and water resource constraints such as flood hazards.

4.3 Land Development Regulations

All of the study area towns also have adopted a set of land development regulations. These may also be referred to as the "Subdivision Ordinance" and/or the "Land Development Ordinance". These typically apply to subdivision of land into three or more lots, and large development projects. While the Zoning Ordinance indicates WHAT uses are permitted on a property, the land development ordinances indicate HOW those uses may be developed. They specify the procedures by which the local regulatory authorities will review and approve proposed land subdivision and development projects and set minimum standards for land development projects that may include more detail than that provided in the Zoning Ordinance. Unlike the Zoning Ordinance, the land development regulations often provide specific requirements for evaluation and protection of natural and cultural resources during the subdivision and land development process. Some towns also have separate but related design standards that are important to preserving natural resources and scenic views.

4.4 Special Resource Protection

Each of the Towns in the study area also has its own set of local ordinances. These local laws cover a wide range of topics based on local priorities. Many of them provide specific protections for resources considered important within the communities. They range from nuisance laws about garbage and debris to "dark skies" ordinances that control outside lighting. This study reviews the local requirements and guidance contained in the ordinances for the protection of wetlands, floodplains, groundwater aquifers, public wells, and any other resources that may related to the protection of the rivers.

4.4.1 Wetlands & Watercourses

Wetlands & Watercourses are protected by state law in both Rhode Island and Connecticut. In Rhode Island, development projects with a potential impact on wetlands are reviewed primarily by the Rhode Island Department of Environmental Management (RIDEM) and wetlands in the vicinity of the coast are regulated by the Coastal Resources Management Council (CRMC). Wetlands are identified by soils, vegetation and hydrology and projects are encouraged to avoid, minimize and mitigate wetlands impacts. Some projects include construction of replacement wetlands but 1:1 replacement by area is not normally required. Rhode Island communities are allowed (at least at present) to administer their own wetlands regulations in existence prior to the new wetland statute (12/2015), but their jurisdiction is limited by the state.

In Connecticut, the cities and towns implement wetlands protection through local Inland Wetlands and Watercourses Commissions (IWWCs or Wetland Commissions) pursuant to the state law. The Wetlands Commissions review development projects at the town level. Jurisdictional areas include the inland wetlands, all watercourses (intermittent and perennial), and a minimum 100-foot "upland review area" surrounding the wetlands and watercourses. Inland wetlands are primarily identified by soil indicators and applicants are required to avoid wetlands, minimize encroachment and mitigate adverse impacts. Mitigation typically requires 1:1 replacement for impacted wetlands by area although exceptions are made where it can be established that replacement of functions and values can be accomplished without 1:1 replacement. The Town of Stonington also includes coastal zone wetlands that are regulated pursuant to state law and the town's Coastal Area Management regulations.

4.4.2 Floodplains

All of the towns in the study area have adopted flood hazard ordinances. These local ordinances are required by the Federal Emergency Management Agency (FEMA) as a condition of participation in the National Flood Insurance Program (NFIP) and most of them are based on the FEMA minimum requirements. As a result, most of them include the same, or similar, provisions that protect floodways, prohibit / regulate development in flood hazard areas, regulate placement of mobile homes in floodplain, and establish requirements for stormwater management, debris management, and often establish erosion and sedimentation control requirements for flood prone areas. Although zoning and subdivision regulations often include flood-related provisions, the town's flood hazard ordinances are often a separate chapter of the town code, and include specific reference to the NFIP, and cite the FEMA Flood Insurance Rate Maps (FIRMs) as depicting the regulated area. Many towns have included flood hazard overlay districts to their zoning regulations with the flood hazard boundaries corresponding to those depicted in the FIRMs.

4.4.3 Stormwater

Regulations regarding stormwater management for new development are generally included in the zoning and subdivision regulations. Additional stormwater ordinances have been adopted by municipalities such as Westerly and Stonington with town-owned stormwater drainage systems as required by the federal Clean Water Act and administered by RIDEM / CTDEEP (the so-called MS4 requirements). Restrictions on new connections, inspection, enforcement and management of stormwater infrastructure are specified.

4.4.4 Groundwater

Most of Rhode Island's groundwater reservoirs and recharge areas lie within the Wood-Pawcatuck watershed. These represent high yield aquifers suitable for public water supply. They were created by glacio-fluvial deposits during the ice age. Areas outside these groundwater reservoirs are also used for individual water supplies and small community and non-community wells. Most of the RI communities in the Wood-Pawcatuck Watershed have groundwater protection overlay districts with additional resource protections including land use restrictions and performance standards for new development.

In Connecticut, significant aquifers are associated with the Shunock, Green Fall, Ashaway and Pawcatuck Rivers. A number of public water supply wells use these groundwater resources. CTDEEP identifies "Level A" (~wellhead) and "Level B" (recharge) aquifer areas and requires municipalities enact regulations to protect these resources. North Stonington has a mapped Level A area on the Shunock west of the North Stonington Village. Both Stonington and North Stonington show large aquifer protection areas associated with the study rivers in their towns.

4.4.5 Wastewater (Septic Systems and Sewers)

Subsurface sewage disposal systems, also known as septic systems or onsite wastewater treatment systems (OWTSs) are regulated by municipalities in Connecticut and by RIDEM in Rhode Island (with various levels of local participation by RI towns). In Rhode Island, OWTSs are regulated, reviewed under the Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems. Rhode Island communities are not (yet) prohibited from enforcing their own standards that are stricter than the state standards. The most common of these

local ordinances establish On-site Wastewater Management Plans (OWMP) and associated Wastewater Management Districts. An OWMP describes the elements of the municipal management program for septic systems. Program elements may include requiring system inspections, enhancing homeowner education, or specifying more stringent treatment requirements in environmentally sensitive areas. Once approved by RIDEM, an OWMP makes a town eligible to apply to the Community Septic System Loan Program (CSSLP). Local OWTS setbacks from wetlands in excess of state standards will not be allowed after RIDEM regulations are adopted in accordance with the revised Freshwater Wetlands Act enacted in December 2015. At this time no implementing regulations have been proposed by RIDEM.

In Connecticut, septic systems, defined as subsurface sewage disposal systems, are regulated by Public Health Code (PHC) Section 19-13-B103 and the associated Technical Standards for Subsurface Sewage Disposal Systems (Technical Standards). Septic systems with design flows of 7,500 gallons per day (GPD) or less are regulated and permitted by the Local Director of Health. Large septic systems serving buildings with design flows of 2,000 to 7,500 GPD, and all systems with design flows greater than 7,500 GPD must be approved by the CT Department of Public Health.

4.4.6 Soil Erosion & Sedimentation

All of the communities in the study area have their own soil erosion and sedimentation control ordinances. These ordinances tend to be oriented toward fulfilling certain requirements of the federal Clean Water Act as implemented through each state's environmental agency; they require minimum controls on soil disturbance during construction to reduce soil erosion and pollutant discharges from stormwater runoff. Relatively small areas of soil disturbance may be regulated, and in a determination of applicability is typically required from the building official for such disturbances. Where applicable, a soil erosion and sedimentation control plan (SESCP) is required to be submitted for local review and approval. Most towns in the study area have such regulations and all require such control plans as part of their land development regulations. In Rhode Island the RIDEM or CRMC reviews SESCPs associated with wetland permit applications, or otherwise regulates land disturbing activities over one acre through its RIPDES General Permit for Stormwater Discharge Associated with Construction Activity. Most towns have a local ordinance that regulates land disturbances much smaller than one acre; in some case the threshold of disturbance may relate to the proximity to regulated water resources.

4.4.7 Resource Extraction

Some of the study area communities, particularly those with a history of quarrying and/or sand and gravel excavation, have adopted local ordinances that regulate mining and resource extraction. These are typically adopted to work in conjunction with erosion and sedimentation control regulations, to reduce noise, protect air and water quality, and regulate truck traffic associated with extractive industries.

4.4.8 Solid Waste

Most study area communities also have local bylaws that regulate solid waste. These vary widely, but almost all are based on the community "Police Powers" for the protection of public health and safety. They typically prohibit unauthorized disposal, littering, trash and debris and, because recycling is mandatory in both Rhode Island and Connecticut, most of them also establish procedures for recycling as well as for solid waste storage, collection and disposal.

4.4.9 Vegetation

Relatively few of the study area towns have ordinances that relate to the protection of vegetation, except perhaps as it relates to maximum impervious cover allowed on a lot. Some towns have tree ordinances, but these are typically restricted to public street trees and/or to trees on public property. Local tree ordinances provide for minimal fines for removing public trees with permission of local authorities. Some towns also have a "Tree Warden" charged with managing publicly owned trees, trimming limbs that overhang streets or utility wires and, as needed, removing trees that are seriously damaged, diseased or otherwise a threat to public safety. A few towns have adopted ordinances to protect rare, threatened or endangered plant species, typically by prohibiting collection and/or by regulating disturbance within critical habitat areas. Most towns' land development regulations include provisions for vegetated buffers and / or landscaping associated with large development proposals.

4.4.10 Special Habitats

Although community plans typically identify important habitat areas in each town, and most of the towns include general requirements for protection of special habitats as part of their development regulations, very few study area towns have chosen to protect special habitats for fish, wildlife, or vegetation directly through local ordinances. Hunting, fishing, and logging are regulated at the state level supplemented by local ordinances. These typically have a stronger focus on public safety and resource sustainability rather than habitat protection. It appears the most common means of protecting special habitats in the study area is for the communities to acquire the land containing those important habitat areas and protect them through public ownership. Open space set-asides and in-lieu fee contributions to public open space are often targeted towards habitat protection. Each state's environmental agency provides mapping of rare species and critical habitats that towns use in conservation planning. The CTDEEP Natural Diversity Data Base program maps have regulatory importance with regard to certain CTDEEP permit programs pursuant to the CT Endangered Species Act and other state laws. In contrast, the RI Natural Heritage Program provides no specific protection for state listed rare species or critical habitats, rather, the RIDEM partners with the private non-profit RI Natural History Survey to track rare species occurrences, update mapping and provide information through RIGIS and direct consultation.

4.4.11 Open Space Conservation

All the study area communities have some local ordinances or regulations for protection of open space. Some require dedication of public open space (or equivalent in lieu fee payment) as a condition of approval for larger developments. Most require that open space at least be identified as part of all major land development projects. All the study area towns have some form of Land Trust, Conservancy or other conservation organization that functions to acquire and protect open space locally. These organizations own land outright, hold conservation easements, and serve as rights holders for acquisition of property development rights. Some Land Trusts are town-specific and are active in only one town; some of these are private and some towns have a municipal land trust. Others are natural resource oriented and are active in more than one community. Jurisdictions frequently overlap such that several communities are served by multiple such organizations. (There are six different Land Trusts currently active in Westerly, RI for example.)

Most of the Land Trusts and Conservancy groups active in the study area have established criteria by which they assess properties under consideration for acquisition and protection. Where those criteria are publicly available, they almost universally include proximity to major rivers, streams, and surface

water bodies as important criteria. Most weight access to surface water very highly in choosing properties for protection. Conservation Commissions in some towns are very active in the identification, prioritization and acquisition of open space for conservation. Most study area towns call for interconnections between parcels of dedicated open space, providing greenbelts or wildlife corridors, often organized around the town's river network.

Towns also typically include other types of open space, conservation, and recreation lands in their open space planning and conservation efforts. These include federal and state protected areas, lands preserved as open space temporarily through easement or tax mechanisms (farm, forest and open space programs for example), undeveloped municipal lands, and private recreation lands.

4.4.12 Historic / Cultural Resources

The study rivers in the Wood-Pawcatuck River watershed include historic villages that date back to the early days of European colonization. Native American cultural resources are also present throughout the Wood-Pawcatuck Watershed as well as the riparian corridors. Historic and other cultural resources occur along the rivers due to their importance for fisheries, transportation and water power. A number of municipalities have enacted regulations to protect these resources, including provisions for resource identification and preservation as part of land development regulations, and historic village overlay districts in the zoning ordinance. Where enacted, such village overlay districts typically attempt to preserve the historic village character with design guidelines / standards. Some towns may require historic / archaeologic studies as part of the land development review process. Most of the historic villages along these rivers include old mills that present difficult challenges for preservation and reuse.

4.5 Summary Comparison Matrix

The Summary of Plans and Ordinances (Table 1 at the end of this report) lists each town along with an indication of the primary regulatory basis of resource protection, if any, for the natural and cultural resources associated with the study river corridors and watersheds. This matrix does not attempt to evaluate the effectiveness of local protections, nor does it discuss regulations applicable only outside the Wood-Pawcatuck Watershed.

5.0 Summary & Recommendations by Town

This section provides a town by town summary of relevant plans and ordinances, and provides recommendations for additional regulatory protection of wild and scenic river values. Recommendations contained in this section relate to local plans and regulations; the reader is also directed to "Action Strategies for the Future", Chapter 6 of the Stewardship Plan for additional voluntary actions which would provide enhanced resource protection in multiple communities. This information is presented by town in alphabetical order, beginning with RI towns followed by CT towns. Each town section begins with an overview of resource protection followed by a discussion of relevant portions of the town's plan, zoning, land development, and special resource protection regulations.

5.1 Rhode Island Towns

5.1.1 Charlestown

The Pawcatuck River forms Charlestown's northern boundary with the towns of Hopkinton, Richmond and South Kingstown. Historic villages on the Pawcatuck include Carolina and Shannock. Extensive conservation land, wetlands and floodplains effectively protect most of the river corridor in Charlestown. Most of the river corridor outside of Carolina and Shannock villages is zoned for open space or low density residential uses. Both Villages have Historic Village Overlay Districts, and the town's Groundwater Protection Overlay District covers much of the river corridor and watershed area in Charlestown. Overall, the Pawcatuck river watershed in Charlestown is expected to remain very rural due to large conservation areas, extensive wetlands, and low density residential zoning. Protection of river ORVs in the historic villages is a priority for the town.

Plans

Charlestown's comprehensive plan has been undergoing a complete revision since 2014 and is expected in a full draft form in 2018. The current adopted plan is the Town of Charlestown, Rhode Island 2006 Comprehensive Plan 5-Year Update approved by the state in 2008. The 5-year update incorporated the original 1991 Comprehensive Plan by reference, especially as it related to existing conditions. The 5 –year update focused on progress towards meeting the original plan goals, and updating plan elements to reflect changed conditions including changes to state guide plans.

The land use element sets the following land use goal and policies (related to river / watershed protections):

Land Use Goal:
To protect the natural and cultural resources and rural character of the Town while providing the housing, economic base, and services necessary for the broad range of residents to enjoy the high quality of life associated with the Town….

Policy 1: Preserve the visual qualities of the villages, shorelines, important natural features, historic areas, scenic roads, and major collectors and arterials.
Policy 2: Preserve vegetated buffers between land uses and roads.
Policy 3: Preserve important natural and cultural features as part of the development regulatory review process for new residential land development and subdivisions.
Policy 4: Maintain the current general patterns, scale, and densities of development, with

the most dense development occurring in villages and generally low-density development occurring outside the village areas.

…

Policy 6: Provide flexibility in land use management tools where appropriate based on natural constraints to encourage alternative land use developments.

Policy 7: Encourage sustainable land uses that support protection of the aquifers and reflect green space development.

…

Policy 8: Work with neighboring communities including the Narragansett Tribe, to ensure that land uses along the common borders of communities are compatible.

Many of these policies include reference to implementation of conservation development practices (low impact development or LID).

The Future Land Use Map in the current plan calls for a combination of uses in the Pawcatuck River corridor including existing protected open space, low density residential uses, and medium density residential uses in the Carolina and Shannock villages. The Kenyon Industries site appears as industrial use, and several parcels of commercial use are also shown in Shannock. Both Shannock and Carolina villages are shown as potential growth centers. Note that a riverside Planned Development District depicted on current zoning maps is shown as protected open space on the Future Land Use Map, reflecting its current ownership by the Nature Conservancy.

The Natural Resources element of the plan sets the following goal with associated policies and actions related to protection of the Pawcatuck River corridor and watershed:

Natural Resource Goal:

To protect and encourage appropriate use of the town's natural resources including groundwater, surface water, the salt ponds, trees, wetland and upland habitats, wildlife, the barrier beaches, historic villages, historic cemeteries, tribal artifacts and sites, scenic views and corridors connecting habitat complexes.

Policy 1: Protect natural resources.

Policy 2: Allow and encourage development that protects natural resources and reflects the natural constraints of the land.

- *Consider density of development in Growth Centers (Cross Mills, Carolina, Shannock) while preserving rural areas from development …*
- *Implement conservation design in subdivision zoning regulations that set high standards for the quality and configuration of the resulting open space and contribute to creating an interconnected network of open space throughout the community.*
- *Protect forested riparian areas along rivers and streams to promote improved water quality, wildlife diversity, enhanced aesthetics, and reduced flooding.*

Policy 3: Protect natural resources through zoning and the development review process, using innovative techniques as they become available or feasible.

- *Promote establishing protective undeveloped zones along water resources and other habitats through the use of setbacks, design standards, exactions, open space dedication.*
- *Consider strengthening the protections provided by the Rhode Island Freshwa-*

ter Wetlands Act by adopting an Erosion and Sedimentation Control Ordinance or amending zoning and subdivision regulations to include the following [list of comprehensive local actions to improve wetland protection in coordination with state agencies].

- *Continue to safeguard the town from new/potential non-point source pollutants.*

Policy 4: Support efforts by others to monitor, evaluate, and implement programs to improve water quality and habitat in the fresh water bodies and salt ponds of the Town.

- *Continue working with the Wood-Pawcatuck Watershed Association and other local water monitoring associations.*

Policy 5: Protect and preserve the quality and quantity of surface waters and the Town's potable water supply.

- *Continue to implement the Town of Charlestown On-Site Wastewater Management Plan.*

Policy 6: Promote appreciation of natural resources by residents and visitors.

- *Promote access to and appreciation of many of the natural resources as appropriate through the continued development of shore access points, hiking paths, and other opportunities for outdoor activities.*
    - *Develop small-scale access ways to the shore, which would allow a few visitors each, such as anglers, hikers, or people who wish to sit and look at the water.*

Policy 7: Create an interconnected network of conservation and / or open space lands.

The plan's Cultural Resources Element contains the following goal and related policies relevant to the river corridor:

Cultural Resources Goal:
To protect and encourage appropriate use of the town's cultural resources, including historic villages, historic cemeteries, tribal artifacts and sites, and scenic views and corridors.

Policy 1: Preserve and protect cultural resources including buildings, features and archeological resources which define the town's character.
Policy 2: Allow and encourage development that protects the cultural resources, including historic villages, structures, and landscapes, scenic vistas and open areas, architectural heritage, and natural features that are important in defining the town's scenic rural character.

- *Establish gateways with signage and landscaping at Pawcatuck River bridges and entrances from Westerly and South Kingstown.*
- *Establish improved physical/visual access to the Pawcatuck River by creating a scenic overlook at Horseshoe Dam.*

Policy 3: Protect cultural resources through zoning and the development review process, using innovative techniques as they become available or feasible.

- *Develop design standards for cultural resources in village districts.*

The plan's Open Space and Recreation Element states the following goal and policies relevant to the Pawcatuck River corridor and watershed:

Open Space and Recreation Goal:
To promote appreciation and appropriate use of Charlestown's natural and cultural

resources by providing a wide range of recreational opportunities for Charlestown's residents and visitors of all ages. To collaborate with partners in the protection of open space through conservation easements, fee acquisition, transfer of development rights, and other techniques to protect rural character and preserve natural resources.

Policy 1: Protect natural resources, cultural resources, important views and visual corridors through open space acquisition, dedications or purchase/transfer of development rights.
A lengthy and comprehensive list of actions supporting this policy is presented; the actions are generally supportive of river protection but not specifically targeted to the river.
…
Policy 4: Continue to provide and expand opportunities for access to fresh/saltwater resources while protecting the resources from adverse impacts of overuse.

The town's Circulation Element stated goal and policies include provisions for protecting the scenic qualities of roadways, including those in the vicinity of the Pawtucket River, and to: "Recognize the importance of bike paths, hiking trails, and "blue trails" (water trails for small non-motorized boats) for recreation and tourism."

Housing and Economic Development goals and policies reiterate the need to protect natural resources and the character of historic villages on the river.

The Services and Facilities Element states the following goal and policies relevant to river protection:

Services and Facilities Goal:
To continue to provide Charlestown residents and visitors with a high level of services which supports the quality of life enjoyed in the Town and is compatible with protecting the town's natural and cultural resources and rural character, at a reasonable tax rate.

- *Policy 10: Support the Parks and Recreation Department in providing enriching recreational experiences and quality facilities.*
- *Policy 11: Revisit its Growth Management Plan to address the continuing cumulative effects of development.*
- *Policy 12: Maintain a long-range program of effective stormwater management designed to protect residents from flooding, to control erosion and sedimentation, and to maintain both surface and groundwater quality and quantity.*
- *Policy 13: Implement the On-Site Wastewater Management Plan.*

Although the current comprehensive planning effort is still underway, public discussions have continued to support the rural character and resource protection orientation of the 1991 plan and 2006 update. As it relates to the Pawcatuck River, much discussion has taken place in regard to the balance between focusing growth in Carolina and Shannock villages while not overburdening the natural capacity of the land to accommodate concentrated development in a sensitive resource area. A suggestion has also been made in the recent planning effort to implement a river corridor overlay district extending from the Pawcatuck River landward a certain distance to help protect river water quality and recreational values.

Zoning

Charlestown's zoning ordinance is Chapter 218 of the town code. The zoning map provided through the town's GIS Department depicts several different zones along the Pawcatuck River including Open Space / Recreation, R3A (3 acre minimum lot size / dwelling unit or DU), R2A (2 ac. minimum lot / DU), and in the Carolina and Shannock villages, R40 (40,000 s.f. minimum lot / DU). These are all low density land use zones with generally low impacts. Actual residential density in the village centers is higher than zoning would indicate, due to pre-existing nonconforming lots. One of the few industrial zones in town is Kenyon Industries, an old mill facility on the Pawcatuck River in Shannock. Small commercial zones occur in both Carolina and Shannock villages near the river.

The zoning map also shows Groundwater Protection and Historic Village Overlay Districts along the river. A Flood Hazard Area Overlay District also occurs along the river.

> Section 218-33 G defines *Overlay Districts. These districts include additional development criteria based upon unique characteristics or environmental features of an area. Along with the regulations of the underlying zoning district, uses permitted by right or by special use permit shall be subject to the regulations of the overlay districts. These overlay districts are as intended by the recommendations of the Town of Charlestown Comprehensive Plan 1991.*
>
> *ARTICLE VIII*
> *Overlay and Mixed Use Districts*
>
> § 218-44. *Flood hazard areas.*
> *These regulations are designed to minimize hazards to persons, damage to property from flooding, to protect watercourses from encroachment and to maintain the capacity of floodplains to retain and carry off floodwaters.*
>
> This section of the zoning ordinance sets forth regulations for town compliance with requirements of the National Flood Insurance Act and Program. The overlay district corresponds to the areas depicted as flood hazard areas on FEMA Flood Insurance Rate Maps. It includes general prohibitions, standards and permit requirements associated with development in this overlay district. Specific requirements are contained in town code Chapter 117 Flood Damage Prevention.
>
> § 218-45. *Historic Village District.*
> *The purpose of the Historic Village Overlay District (HV) is to protect, preserve and maintain the quality of the Town's villages, to preserve the Town's heritage, cultural and architectural qualities, to foster civic beauty, to strengthen the local economy and to promote the use of such districts for the education, pleasure and welfare of the citizens of the Town.*
>
> This section requires permits for new, non-residential construction based on HV Overlay standards, and itemizes certain prohibited uses.
>
> *D. Historic District Standards. The Planning Commission acting under the relevant provi-*

sions of this Article shall determine the appropriateness of design elements of proposed buildings and alterations of existing buildings within the HV. Proposals shall be evaluated in relation to existing, adjacent and surrounding buildings. To be considered appropriate, buildings shall reflect the Charlestown traditional building style which is rural in character and similar to existing buildings.

This part continues with a number of different design parameters to be considered.

§ 218-46. *Groundwater Protection District.*
The purposes of the Groundwater Protection (GWP) District are to protect, preserve and maintain the quality and supply of the groundwater resources upon which the Town depends upon for a present and future water supply. It is also intended to implement the Town of Charlestown Comprehensive Plan1991. The character of soils and subsoil conditions in this district is such that any use introducing pollutants, contaminants or wastes into the soil or the natural drainage system could adversely affect the quality of drinking water sources. The entire Town is dependent upon groundwater, therefore, regulation of land uses and land use practices that could contribute to the degradation of groundwater quality is necessary to ensure that the Town's current and future water sources are suitable for drinking water use. The entire Town is designated a moderate protection district for groundwater protection to be regulated by the prohibited uses, district use table, and the performance standards of this Ordinance. This Section is further intended to establish the GWP District as a high protection district.

The GWP Overlay District includes all wellhead protection areas identified by RIDEM; and the groundwater reservoirs and critical recharge areas delineated by RIDEM and classified as Class GAA groundwater areas. Prohibited uses are identified and consist of uses typically associated with groundwater contamination. Additional site plan review standards pertain to development in the GWP District, including assessment of impacts to groundwater and requirements to mitigate potential contamination with site specific control measures.

Another zoning ordinance related to river protection is section 218-76 Liquid Wastes, which prohibits the discharge of liquid wastes (pollutants) into "any river, pond, stream, wetland or any drinking water supply."

<u>Land Development</u>

Charlestown's subdivision and land development regulations are contained in Chapter 188 of the town code to "…establish procedural provisions for the subdivision of land and land development projects. The Planning Commission shall have the power to negotiate with applicants filing under these regulations to ensure the protection of the Town's natural and built environment." The stated purposes of the ordinance includes orderly development in conformance with the Comprehensive Plan, direction of new development to areas most suitable in terms of land capability, avoidance of adverse impacts to environmental resources, and mitigation measures to eliminate adverse impacts to resources. The ordinance conforms to the state enabling legislation's procedural requirements.

This ordinance applies to all subdivision of land in town and sets administrative procedures and

technical standards for review and approval for basic types of subdivision (administrative, minor and major). Throughout these regulations there is a consistent emphasis on managed growth and protection of natural resources. Conservation development and LID practices are promoted. The articulation of guiding policies for subdivision plan review and approval are contained in section 1.3, including:

- *Conformance with the Charlestown Comprehensive Plan …*
- *Conformance with the Charlestown Zoning Ordinance…*
- *Adherence to best available practices and techniques for site design to provide for a) adequate, and safe circulation of pedestrian and vehicular traffic and emergency services, b) control and minimization of soil erosion and stormwater runoff volume and pollutant load, c) suitable building sites, d) the preservation of natural features, and e) adequate sewage disposal.*
- *Preservation of the rural character of the Town.*
- *Protection of the Town's surface and groundwater resources, to prevent degradation of water quality, and where possible, to improve water quality.*
- *Provision of sufficient open space and recreational facilities to accommodate the projected intensity of use of the proposed site.*
- *Preservation of natural terrain, vegetation, soils, historical resources, floodplains, wetlands, drainage and reducing the need for cutting and filling on steep grades.*
- *Establishing the adequacy of existing public improvements and services in the area including but not limited to water, sewer, drainage, roads, schools, recreation facilities, solid waste, fire and police protection*
- *Minimizing flood damage and the potential thereof*

The regulation's authority and intent (section 1), definitions (section 2), general requirements (section 3) and special provisions (section 4) are clearly oriented towards managed growth, low impact development, and resource protection. Requirements include detailed environmental impact analysis. The ordinance requires all major residential subdivisions to be residential cluster subdivisions (concentrating development away from sensitive resources). Section 5 requires dedication of recreation facilities and open space as part of the proposed development, including a minimum 40% of developable land area set aside as protected open space. Section 11 Physical Design and Public Improvement Standards and section 12 Construction Specifications provide details on requirements related to flood hazard protection, stormwater management and soil erosion and sediment control among others.

<u>Special Resource Protection</u>

Special resource protection includes previously described overlay zoning districts for Groundwater Protection, Historic Village, and Flood Hazard Areas. The requirements for the GWP and HV overlay districts are contained in the zoning ordinance.

Flood Damage Prevention

The detailed requirements related to development in the Flood Hazard Area overlay district are contained in the town code Chapter 117 Flood Damage Prevention; the requirements ensure conformance with the NFIP administered by FEMA. This regulation requires permits for building in flood hazard areas, standards for permit approval, and administration of the regulation by the Building Official.

Boats and Waterways
Chapter 86 of the town code regulates boat operation on all waters in Charlestown. The ordinance promotes safe boat operation with respect to other waterway users including operation near bathing beaches.

Erosion and Sediment Control
Chapter 174 of the town code provides detailed requirements related to erosion and sedimentation control. This ordinance specifies that anticipated land disturbances of 1 acre or more, or smaller disturbances requiring RIDEM or CRMC permitting must first receive a determination of applicability from the building official. "Upon determination of applicability, the owner/applicant shall submit a Soil Erosion and Sediment Control plan for approval by the building official or his or her designee, as provided in Section 174-4." The specifications and procedures for submission, review and approval of this plan is set out in the remainder of this chapter.

Wastewater Management District
Chapter 210 of the town code establishes a Wastewater Management District (WWMD) as a means of promoting proper operation, inspection and maintenance of onsite wastewater management systems (OWTS, previously referred to as individual sewage disposal systems [ISDS] or simply septic systems). The WWMD is applicable to all OWTS in town so it is essentially a town-wide district. This chapter sets requirements for inspection and pumping and establishes a Wastewater Management Commission to administer the regulations. If inspection reveals a failed system the owner will be notified and compelled to make repairs.

<u>Recommendations</u>

- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.
- Update zoning map to reflect permanently protected open space (e.g., PDD zone near railroad).

5.1.2 Exeter

Almost all of Exeter lies within the Wood-Pawcatuck Watershed. Portions of the Beaver, Queen, and Wood Rivers cross the town. A portion of the Chipuxet watershed occurs at the southeast corner of town. The Wood River segment is almost entirely within permanently protected open space (RIDEM's Arcadia Management Area), and the associated watershed is similarly dominated by protected open space, with other lands in low density uses. The Beaver River lies in a low density residential area east of the I-95 corridor with its more intensive land uses. Most of the Queen River corridor is protected by dedicated conservation lands. The groundwater reservoirs (aquifers) and associated recharge areas associated with the Chipuxet, Queen, and Wood Rivers are further protected by the towns' Ground Water Protection Overlay district. Overall, the town's plan and regulations provide good protection to the rivers and their ORVs.

Plans

Exeter's Comprehensive plan dates from 2009, with some revisions done in 2011. State approval expired in 2009, but the plan remains in effect locally. It provides the legal basis for the town's Zoning Ordinance and is still consulted in making policy decisions and setting priorities locally.

The plan portrays Exeter residents as environmental stewards not only for the town, but for the region. Page 27 says: "Rivers, streams, ponds and their associated wetlands form the core of Exeter's pristine ecosystems. They also play a key role in maintaining the water supply for much of South County."

The plan recommends a "Village" approach to development to provide for development without damaging natural resource systems. It says: "Combined with continued efforts to preserve entirely the most sensitive parcels, this approach can help to protect entire watersheds, such as the Queen River, that are critical to the future environmental health and water supply for the whole region." Locations recommended for village development are at the intersection of Route 2 and Exeter Road and in the Route 95 interchange area.

The plan is unusually frank about "rural character" describing it as "a town where open space is the dominant element, where the experience of traveling through the town is organized by river valleys, forests, ridgelines and swaths of farmland rather than strip malls and subdivisions." It talks about maintaining "the working landscape of farms, not to mention the people who work in that landscape." It recommends that Exeter establish a Municipal Land Trust to help with Transfer of Development Rights (TDR), handle "fee in lieu of" payments, and acquire property for open space and conservation

The plan compares "conventional" development with the recommended "village" development in terms of potential impacts. It also compares "village" development at a variety of densities from half acre to eighth acre (with TDR) and ends up recommending a mix of lot sizes that results in higher density in the village center and lower density around the perimeter. Chapter VII provides detailed design guidelines for the Exeter Road Village site and Chapter VIII provides draft ordinances for implementing Village development.

On page 35 there is a map illustrating watersheds in Exeter. The caption says the town contains parts of "nine or ten different river basins". The plan encourages balancing of water use with

wastewater disposal using on-site wastewater treatment systems (OWTS) to avoid inter basin transfer of water in the villages.

Zoning

Exeter's zoning (Appendix A of the town code) indicates that it takes the stewardship role described in the Comprehensive Plan seriously. The Introduction to the Zoning Ordinance says:

"Exeter, at this time, is in an excellent position to develop a series of goals and objectives for future town growth. The community presents, with minor exceptions, an unspoiled landscape which the people of Exeter and the town government have expressed a firm commitment to preserve through the adoption of a comprehensive plan. Now our Town can take positive actions to avoid the mistakes of other communities."

The Ordinance provides for eleven different zoning districts, ranging in density from undeveloped land such as Conservation and Recreation (CR—5) or Open Space and Public Lands (OSPL) to the more densely developed Business (B), Planned District (PD) and Planned Village Overlay District (PVOD). The three residential districts, RU-4, RU-3 and RE-2, all represent low density residential zones with 4 acre, 3 acre, and 2 acre minimum lot size per DU, respectively. The Ordinance includes a Groundwater protection overlay district (GWOL) with subareas for primary aquifer and for recharge area. It also provides for resource protection through Conservation Development and Rural Residential Compounds.

Exeter applies a strict standard to development near rivers, wetlands and water bodies. Section 2.5 of the Zoning Ordinance, Development Plan Review includes, among the many requirements, that: "Whenever situated in the whole or in part, within 300 feet of any pond, lake, river or other freshwater wetland (as defined by RIDEM), the proposed project shall not adversely effect [sic] the quality of such body of water or unreasonably affect the shoreline of such body of water. There will be no disturbance of soil within 100 feet of the outer edge of a wetland (as defined by RIDEM)."

The zoning map indicates that the western part of Exeter, within the Wood River watershed (west of Route I-95) is almost entirely zoned Open Space and Public Land (OSPL) or Conservation/Recreation (CR-5). There are only two small areas west of I-95 that are not zoned OSPL or CR-5 one is at Boone Lake and the other at Arcadia. Both are zoned Residential (RE-2) and are areas of existing residential development. There is also a groundwater protection overlay protecting the Wood River aquifer and recharge area. A narrow strip of Land along Route I-95 is zoned for residential (RE-2), Business (B), Light Business/Residential (LB/R) and Light Industrial (LI) uses to take advantage of the highway access. This strip of business lies at the east edge of the Wood River watershed and over three miles from the river itself.

East of I-95, the watershed of the Queen River is mostly zoned Rural District (RU-3 and RU-4) or Open Space and Public Land (OSPL). To the east, the Queen River watershed is also mostly Rural District (RU-4) except for the proposed village which is zoned Planned Development (PD). All the land along the Queen River on both sides is Conservation/Recreation (CR-5) and/or Open Space (OSPL). There is also a Ground Water Overlay (GWOL) district that applies to the Queen River aquifer and recharge area.

The Chipuxet watershed in the southeast part of Exeter is about half zoned RU-4. The other half is split between Residential (RE-2), Business (B), Planned Development (PD) and Light Business/ Residential (LB/R) zones along Route 2. This area also includes a Groundwater Overlay Zone (GWOL) applicable to the Chipuxet Aquifer and the Chipuxet recharge area.

Land Development

The Exeter Land Development and Subdivision Regulations (town code Appendix B) are consistent with the state enabling legislation at G.L. 1956, §§ 45-23-25—45-23-74, as amended. Section 1 provides the authority and purposes. One stated purpose is "To promote the protection of the existing natural and built environment and the mitigation of all significant negative impacts of any proposed development on the existing environment." Section 2 provides definitions. Among these is "Watercourse. A permanent stream, intermittent stream, river, brook, creek, or a channel or ditch for water, whether natural or manmade."

Section 3 lists general requirements, submissions, fees, and appeals. Subection 3.4 provides that an Environmental and Community Impact Study (ECIS) may be required in cases where the Board finds that there is a "reasonable expectation" that the proposed subdivision or land development project may have a negative environmental impact. Among the many topics to be addressed by an ECIS, the Ordinance lists: fresh water wetlands, flooding and drainage, natural heritage sites, surface water. water quality, streams and rivers, and public wells and wellfields. The Board is empowered to impose conditions as may be necessary to minimize adverse impacts.

Section 4 lists special requirements such as off-site improvements, project phasing, waivers, reinstatement, and procedures for dedication of public land. Section 5 authorizes conservation development and specifies applicable procedures. Section 6 covers the application, review and approval process, including the process for Transfer of Development Rights (TDR). TDR is a tool for the preservation of farmland and/or open space. It is not common within the study area, but it allows receiver sites to develop to higher densities by purchasing or otherwise acquiring development rights from donor sites. There is also a "fee in lieu of" option.

Exeter and adjacent North Kingstown have an inter town TDR agreement that is unique among Rhode Island communities. Criteria for determining the score for TDR donor areas in Section 6 include: "Parcel is part of a designated green corridor priority area such as the Queen River Watershed and Arcadia Management Area." Habitat values and rare species are also weighed heavily in the process.

Section 7 provides Design and Improvement Standards. Section 7.2 D protects wetlands, stating: "No fresh water wetlands, as defined in chapter 213 of the Public Laws of 1971 and as amended in the future, shall be excavated, drained or filled nor shall any extraneous materials be placed into these wetlands. Water flow shall not be diverted nor shall any change be made to the natural condition of fresh water wetlands without prior approval of the director of the state department of environmental management and the town council in accordance with the provisions of said chapter."

The balance of the Ordinance is administrative. Section 8 is amendment procedures. Section 9 is on application of the regulations. Section 10 provides appeal procedures, 11 is "Severability",

12 Is the application checklist and 13 provides Construction Specifications.

Special Resource Protection

In addition to the groundwater protection noted above, Exeter has several ordinances that provide additional protection to natural resources.

Exeter regulates flood hazard areas Under Chapter 22- Environment, Article IV Special Flood Hazard. The ordinance conforms to FEMA guidance to meet requirements for participation in the National Flood Insurance Program (NFIP). Chapter 23 provides standards for erosion and sedimentation control. Article III requires an Erosion and Sediment Control Plan for earth excavation and construction activities (1/2 ac. or more, or within 100-feet of a watercourse, or on steep slopes).

Chapter 30 – Natural Resources has a [reserved] Article I and an Article II that establishes requirements for earth removal operations. Chapter 34 pertains to solid waste and recycling but includes protections for wetlands, surface water bodies, and wellhead areas. Chapter 50 – Waterways includes an Article I – In General. That section may offer some promise for a future "Blueways" ordinance but, at present, is [reserved]. Article II (the balance of the Chapter) address activities allowed and/or prohibited at Boone Lake exclusively.

Recommendations

- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.

5.1.3 Hopkinton

Hopkinton lies entirely within the Wood-Pawcatuck Watershed; it is bounded on the west by the CT state line (about 2 miles west of Green Fall River) and the Ashaway River, to the south by the Pawcatuck River, and to the East by the Wood River. Significant portions of the Wood and Pawcatuck River corridors are protected by dedicated open space / conservation lands. Almost all of the remaining lands in the river corridors (and watersheds) are in low density residential use or woodlands. The areas around the I-95 interchanges are more intensely developed, and future development is planned to continue this pattern. The town also has a groundwater and wellhead protection areas that cover almost all of the river corridors (and much of the watersheds) except a short segment of the Pawcatuck River in Burdickville. The town's Comprehensive Plan includes specific support for preservation and protection of the rivers in the Wood-Pawcatuck Watershed. Overall, the town plan and regulations provide very good protection to the rivers and associated ORVs.

Plans

Hopkinton has just completed an update to its Comprehensive Plan. The new plan was adopted by the Town Council on February 5th of 2018 and accepted by the State on March 27th, 2018. The new plan starts off (page 2) with a discussion of the need for regional cooperation. It says:

"- The Pawcatuck and Wood rivers are important natural resources for the towns of Charlestown, Hopkinton, Richmond and Westerly. They contribute to recreational and economic development opportunities for all three towns. The municipalities must therefore coordinate projects to protect water quality and preserve important habitat. Cooperative activities include watershed management, open space acquisition, and groundwater protection."

The update included a public survey and a series of programmed interactions with residents. The plan (page 3) cites strong resident support for continuing actions to protect open spaces, local rivers and watersheds.

Under the topic "Recreation, Conservation, and Open Space", the plan discusses "blueways". it says that the Wood and Pawcatuck rivers, along with the many lakes, ponds, and streams in Hopkinton, provide important parts of the network of blueways that traverse the state of Rhode Island. These provide canoe and kayak routes and support water based recreation for residents and visitors alike. A complete inventory of outdoor recreation and open space resources, including the "blueways" is provided in Appendix B.

According to the plan, proximity to Rivers and surface water bodies is one of the top 3 criteria used by the Hopkinton Land Trust to rank properties for acquisition.

One of the top recreational priorities is to Improve access to the rivers for hiking and fishing. Recreational Recommendation 2 (page 17) is: "Develop a plan and maintenance program for town property on the Wood River and Bridge Street to provide better access to the river for fishermen, kayakers, and canoeists and as a possible picnic site." Recommendation 6 includes: "Organize local volunteer groups to help maintain trails, riverbank areas and greenways."

The Economic Development part of the plan notes that canoeing, kayaking, hunting, and fishing, all activities considered "recreational" in most communities, are essential parts of the Hopkin-

ton economy. According to the plan, local gun shops, bait and tackle stores, outfitters, tour guides, restaurants, bars, and convenience stores all derive much of their revenue from visitors coming to Hopkinton to enjoy its rivers, streams, ponds and rich natural resources. The plan implies that Hopkinton "exports" these resources regionally. It's no surprise, therefore, that Policy ED 11 (page 69) says: "Support the efforts of the Wood-Pawcatuck Watershed Association (WPWA) in pursuit of Wild and Scenic Rivers designation." What is surprising is that this goal appears in the Economic Development chapter of the plan as well as in the Conservation, Recreation and Open Space chapter. The Economic Development section goes on to include multiple recommendations to enhance tourism including regional programs for promotional brochures, better signage for wayfinding and site identification, and improved services such as debris and trash removal and possibly rest rooms at major public sites.

The Hazard Mitigation section of the plan (page 94) notes that the same rivers that drive the local economy and help make Hopkinton a great place to live are also the sources of the most serious flooding problems in the community. Because the original settlement of Hopkinton was organized around water powered mills, the town's historic villages tend to be along the rivers in low lying locations where they are vulnerable to flood damage. Waterways identified as flooding concerns include the Ashaway River, Wood River, the Pawcatuck River, Canonchet Brook, Tomaquag Brook, Brushy Brook, and Parmenter Brook (page 96).

Map 11 shows the flood hazard areas associated with these waterways and the Hazard Mitigation section goes on to describe a range of activities to be undertaken in each of the vulnerable areas to decrease the potential for flood damage, reduce adverse impacts of flooding, prevent erosion, minimize sedimentation, and protect water quality during flooding events.

The importance of the rivers is also included in the Land Use section. The Future Land Use Map shows most of the land along the rivers as reserved for low density residential uses, open space and recreation, and permanently protected land. Policy 1 in the Land Use section says: "Work with the Wood-Pawcatuck River Association and other groups in their efforts to preserve river corridors and develop opportunities for use of the rivers." Recommendation LU-4 says: "Partner with the Wood-Pawcatuck River Association and other groups in public educational efforts, prioritizing areas for river use and developing joint proposals/grant applications for the preservation and utilization of river corridors."

Zoning

The Hopkinton Zoning Ordinance provides considerable protection for the lands along the Ashaway River, Wood River, Pawcatuck River and their tributaries. The Zoning map places the overwhelming majority of land adjacent to the rivers in the RFR-80 Zone, a zone that restricts uses to residential at a density of one DU per 80,000 s.f. (approximately 2 acres per house). The RFR-80 district requires a minimum of 225 feet of frontage and very generous front rear and side setbacks of 60, 40, and 50 feet respectively. The ordinance indicates this very low density is intended to protect water quality and to preserve the rural character of the community. Exceptions occur in the historic mill villages where the zoning recognizes and encourages continuation of industrial and commercial uses that are already in place.

The stated purposes of the Ordinance include providing for orderly growth and development that recognizes: "The natural characteristics of the land, including its suitability for use based

on soil characteristics, topography, and susceptibility to surface or groundwater pollution; [and…] The values and dynamic nature of freshwater ponds and wetlands."

Section 14 of the Ordinance includes sections providing for Residential Compounds, Cluster Developments and Planned Unit Developments as measures to allow development to proceed while protecting important natural resources. The Ordinance requires Board review of all Land Development Projects, Residential Compounds, Planned Unit Developments, and Cluster developments and provides review criteria that include reducing the potential adverse impacts of development.

Section 33 establishes a Floodplain and Watercourse Protection Zone as an overlay district that complies with the requirements of the National Flood Insurance Program. This section prohibits encroachment in the floodway and restricts development in flood prone areas unless it can be shown that:

> *"(1) There shall be no encroachment, interference, alteration or restriction of the natural drainage or flow within the floodplain or watercourse except by special use permit, and (2) None of the permitted uses shall result in the deposition of trash, fill earth sediment, debris, or liquid or solid waste matter of any kind into any watercourse or area within the zone except by special use permit. "*

Land Development

The Hopkinton Land Development and Subdivision Regulations (9/3/14) include several provisions specific to the rivers. In the definitions, Floodplain is defined as: "The low lands adjoining the channel of a river, stream, or water-course, lake or other body of standing water, which have been or may be inundated by flood water. The channel of a stream or watercourse is part of the flood plain; an area that has one percent (1%) or greater chance of inundation in any given year, as delineated by the FEMA pursuant to the National Flood Insurance Act of 1968, as amended (P.L. 90-448) [42 U.S.C. 4011 et. Seq.]. See R.I.G.L. § 45-220.2-4.

At page 16, the regulations define land unsuitable for development as including: "Fresh water wetlands, including that area of perimeter wetland within 50 feet of the edge of any bog, marsh, swamp or pond; or any applicable 100-foot or 200-foot riverbank wetlands, as defined by Rhode Island General Law § 2-1-20 (1987), as amended. This definition extends considerable protection to the major rivers by declaring that all land within 200 feet of any river greater than 10' in width by is unsuitable for development.

On page 19, the plan identifies significant resources that need to be protected in development as including: "Inland rivers, streams, creeks, freshwater wetlands and marshes, wildlife habitats, beaches, islands, ponds, aquifers and recharge areas, drainage basins, historic features and public open space."

The Development Plan Guidelines (page 144) specify that: "Building envelopes shall be located so that character-defining site features such as stone walls, open fields, stands of mature trees, rolling topography, ridgelines and outcrops, wetlands, streams, rivers, ponds, lakes, and listed historic natural resources are preserved."

Special Resource Protection

Hopkinton also has several local ordinances directed specifically at protection of the rivers. Section 8.4 Motorized Boats prohibits "operation on any pond, lake, river or body of water in the town of any boat propelled by motor unless such motor is equipped with underwater exhaust or proper muffler or device to so reduce the noise of such motor that the operation of such boat and motor does not disturb and annoy the members of the public."

Article II, Division 3, Section 2.66 Establishes the Hopkinton Conservation Commission and assigns it responsibility to: promote and develop the natural resources, to protect the watershed resources, and to preserve natural esthetic areas within the town." It authorizes the Commission to "conduct research into local land areas and…coordinate the activities of unofficial bodies organized for similar purposes." The Commission may also "recommend to the town council a program for the better promotion, development, utilization, or preservation of open areas, streams, shores, wooded areas, roadsides, swamps, marshlands, and natural esthetic areas, which shall also include areas to be included for recreational facilities for the town."

Section 10.1 prohibits depositing "any filth, offal, papers, food, particles, glass, bottles, cans or other rubbish or any animal or vegetable matter" into rivers and streams. The Dark Skies Ordinance (16.5.2) sets requirements for waterfront lighting throughout the town. Subsection F Waterfront Lighting sets specific requirements for lighting of docks, paths and shorelines to keep lighting levels low and it prohibits light from being directed to the water's surface more than 20 feet from shore.

<u>Recommendations</u>

- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.

5.1.4 North Kingstown

The western border of North Kingstown lies along the northeastern border of the Chipuxet River watershed. A very small portion of the Queen River watershed lies along the town border in the vicinity of Hatchery Road. Neither the Queen River nor Chipuxet River occurs in or near North Kingstown. A relatively small area of the Chipuxet watershed extends into North Kingstown in the vicinity of Slocum Road and Indian Corner Road. Zoning includes low and moderate density residential districts, light industrial and general industrial districts, and a few small parcels with commercial zoning. The future land use map depicts "protected land" over much of the existing general industry and moderate density residential zones where a turf farm presently exists. The comprehensive plan identifies these protected areas as conservation areas, including various types of protection. Overall, the potential for new development appears limited in this portion of the watershed and the future land use is expected to reflect low to moderate density residential land uses, farmland and woodland. Although a relatively small area of the watershed occurs in North Kingstown, its importance is increased by its position over the Chipuxet aquifer. The town's Groundwater Protection Overlay District covers almost all of the Chipuxet watershed, affording an even higher level of water resource protection.

Plans

North Kingstown's "Draft Town of North Kingstown Comprehensive Plan 2016" was reviewed as the most current and complete plan, although it has not been adopted (the previous approved plan is from 2008 and has expired).

The plan's vision statement in Element 4 A Sustainable Town, a Plan for Open Space and the Environment is:

> *We are a healthy and sustainable town that invests in protecting our natural resources and open space for their economic, environmental, recreational, and scenic value. North Kingstown will protect its natural resources and provide a range of recreational opportunities that enhance the quality of life and the health of all residents, as well as contribute to a healthy ecosystem through the preservation of open spaces and the integration of climate and flood resiliency.*

Goals that support this vision are:

> *1. Protect, preserve, and restore natural resources*
> *2. Promote sustainable water and energy measures to conserve resources and reduce greenhouse gas emissions*
> *3. Increase public awareness of conservation and sustainability*
> *4. Provide high quality recreation facilities and opportunities for all residents*
> *5. Enhance public access to active open space, recreation areas and the waterfront*

This element describes the importance of the groundwater aquifer and associated recharge area which covers almost all of the Chipuxet River watershed area in North Kingstown. The town's Groundwater Overlay District coincides with the recharge area boundaries. "The groundwater overlay is the key regulation that controls development within these sensitive areas of groundwater recharge by restricting certain uses and limiting density."

The plan promotes "….Conservation Development … which looks at the character of each piece of land proposed for development and determines the best locations for new construction and the means to construct the project to preserve natural features and improve the livability of the project." The Housing and Land Use Elements identify the following action item:

- *Continue to use conservation development and low impact development standards to preserve open space, facilitate stormwater management, protect surface water and groundwater resources, maintain town character, and maximize the use and efficiency of existing infrastructure and alternative modes of transportation.*

Zoning

North Kingstown's zoning ordinance is Chapter 21 of the town code, Part III Revised Ordinances. The zoning map depicts a number of different zoning districts within the Chipuxet River watershed. However, acquisition of open space and/or development rights appears to have eliminated the need for the mapped General Industry zone, most of the Light Industry zone, and the moderate density Village Residential zone the map shows in this area. The zoning map shows residential districts throughout the remainder of the subject watershed, including Rural Residential RR-80 (80,000 s.f. minimum lot size), and Neighborhood Residential NR-40 (40,000 s.f. lots). In addition to the existing low density residential development and conservation areas, this watershed area and its high yield, sole source aquifer receive further protection through the Groundwater Protection Overlay District.

The zoning ordinance section 21-9 (b) Overlay districts, states:

> *The following supplemental overlay districts are established: very severe limitations, severe limitations, steep slope, groundwater recharge and wellhead and groundwater reservoir, special flood hazard, scenic, historic, residential compound development and cluster development.*

The ordinance also defines "receiving area zoning district" and "sending area" overlay districts as they relate to transferable development rights (TDRs).

Article VIII of the ordinance "Overlay Districts" provides the overlay district regulations related to soil constraints (very severe limitations, severe limitations, steep slope, groundwater protection, special flood hazard, scenic and sending area overlay districts noted above). Within the Chipuxet River watershed, North Kingstown's groundwater protection overlay district is the most important of these in terms of water resource protection.

Sec. 21-186. - Groundwater recharge and wellhead protection overlay districts.
This section establishes two zones. Zone 1 groundwater protection zones are public water supply wellhead protection areas and the area within a 1,750-foot radius around transient non-community water supply system wells. Zone 2 groundwater protection areas comprised of the critical groundwater recharge areas associated with groundwater reservoirs or otherwise named in the ordinance. Within the subject watershed, the Annaquatucket Wellhead Protection Area (Zone 1) spans the watershed divide near Route 4. The Chipuxet aquifer is specifically named in section 21-186, and it is included in Zone 1 and its critical recharge area comprises

part of Zone 2. As it applies to the underlying zoning and existing land development / conservation in the subject watershed, the development criteria limit residential density to a minimum average density of one DU per two acres and "All new commercial and industrial development must show that the nitrate loading standard of five mg/l as set forth in article VI of chapter 8 of this Code, pertaining to groundwater reservoirs and recharge areas, can be met on site using a conventional individual sewage disposal system."

Land Development

North Kingstown's subdivision and land development regulations are contained in Appendix A of the town code, Part III Revised Ordinances. These regulations may have applicability to some parcels in the Chipuxet watershed, but unconstrained land available for development is very limited. These regulations are intended

> *to establish the procedural and substantive provisions for the subdivision and development of land in order to ensure the orderly growth of the Town of North Kingstown and to:*
> *(1) Protect the public health, safety and welfare;*
> *(2) Provide for the orderly, thorough and expeditious review and approval of land developments and subdivisions;*
> *(3) Promote high quality and appropriate design and construction of land developments and subdivisions;*
> *(4) Protect the existing natural and built environment and to mitigate all significant negative impacts of any proposed development on the existing environment;*
> *(5) Promote design of land developments and subdivisions which are well-integrated with the surrounding neighborhoods with regard to natural and built features, and which concentrate development in areas which can best support intensive use by reason of natural characteristics and existing infrastructure;*
> *(6) Provide thorough technical review of all proposed land developments and subdivisions;*
> *(7) Provide local design and improvement standards to reflect the intent of the comprehensive plan with regard to the physical character of the various neighborhoods and districts of the Town of North Kingstown;*
> *(8) Encourage, fairly apply and administer dedications of public land, impact mitigation and payment in lieu thereof based on clear documentation and of needs;*
> *(9) Establish consistent application of procedures for local recordkeeping on all matters of land development and subdivision review, approval, and construction.*
> *(10) Enhance the nature of the natural environment through the development process wherever possible;*
> *(11) Encourage development consistent with the policies, goals and objectives of the town's comprehensive plan, particularly with regard to the protection of interconnected networks of open space and greenway systems;*
> *(12) Encourage the ecological enhancement and restoration of existing site conditions on land proposed for development.*

The ordinance promotes alternatives to conventional subdivisions including cluster and/or conservation development. Conservation development is based on the concept of locating development on the most suitable portion of the site, minimizing adverse impacts. To calculate the allowed density of a conservation development, the land unsuitable for development must first

be subtracted from the total lot area, the resulting buildable area is used as a basis for calculating the number of allowed DUs, based on the zoning district. North Kingstown identifies areas with severe limitations, very severe limitations, including rock outcrops, wetlands, high water table soils, and flood hazard areas as unsuitable for development (zoning section 21-22). Conservation development is described in detail in Article 13 of the subdivision regulations. Article 14.0 - Design and Improvement Standards and Article 15.0 - Construction Specifications and Methods provide specific development requirements for all subdivisions and major land development projects.

Special Resource Protection

The most applicable resource protection measures for the Chipuxet River watershed in North Kingstown are contained in the zoning ordinance as designated overlay districts previously described (e.g., groundwater protection, flood hazard, etc.). Additional or supplemental regulations in the code are included in code Chapter 8 Health and Sanitation:

- Article III Sewage Disposal
- Article VII Groundwater Reservoirs and Groundwater Recharge Areas
- Article VIII North Kingstown Wastewater Management District
- Article IX Stormwater Management
    - Division 1. - Prohibition Of Illicit Discharges And Illegal Connections
    - Division 2. - Soil Erosion And Sediment Control
    - Division 3. - Post Construction Stormwater Control

An additional and potentially relevant ordinance is code Chapter 16 - Soil and Earth Removal (e.g., sand and gravel mining or as might result from major site grading).

Sewage Disposal
Article III Sewage Disposal focuses on proper sewage disposal from septic systems (OWTS) but also includes industrial wastewater disposal. It provides standards for septic system component cleaning, septic tank pumping and regulation of septage haulers.

Groundwater Protection
Article VII Groundwater Reservoirs and Groundwater Recharge Areas provides for the protection of groundwater throughout the town as the sole source of all drinking water in town, and it identifies specific groundwater reservoirs and recharge areas (somewhat differently than described in the Groundwater Protection Overlay District in the zoning regulations). This ordinance itemizes a list of some chemical, bacterial and radionuclide pollutants and associated water quality criteria, perhaps based on RIDEM / US EPA water quality criteria.

OWTS Wastewater Management
Article VIII establishes the North Kingstown Wastewater Management District (NKWWMD) to ensure that individual sewage disposal systems are properly operated, regularly inspected and routinely maintained to prevent malfunctioning systems. This district encompasses the entire town and is similar in scope and nature to that previously described for the Town of Charlestown.

Stormwater Management
Article IX includes three divisions. Division 1 provides for the town's regulatory compliance with

RIDEM stormwater management requirements for certain (MS4) municipalities – it governs town requirements regarding management of the town stormwater drainage system including prohibitions of certain connections and discharges. Division 2 sets forth the Town's primary erosion and sedimentation control ordinance, requiring those involved in land disturbances to first obtain a determination of applicability from the building official, and if found applicable the land owner must submit an erosion and sediment control plan to the town for approval. The ordinance lists a number of minor land disturbing activities that do not require a determination of applicability. The ordinance sets specific requirements for erosion and sedimentation control plan preparation and approval. It also sets forth inspection and compliance standards. Division 3 relates to ongoing long-term management of stormwater from certain types of development such as subdivisions. It follows state regulations related to stormwater management, requires preparation and approval of a stormwater management plan, and specifies requirements for long-term operation and maintenance of stormwater management facilities at the site.

Resource Extraction

Chapter 16 - Soil and Earth Removal governs activities such as rock quarrying, sand and gravel mining, major site grading and stripping of topsoil that could potentially result in adverse impacts to groundwater and other natural resources. Pre-existing sand and gravel operations are exempted, as are certain minor removal activities. This ordinance specifies requirements for site plan preparation and approval, including post-excavation site restoration. It also includes standards for earth removal operations.

<u>Recommendations</u>

- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.

5.1.5 Richmond

Richmond is entirely within the Wood-Pawcatuck Watershed and is bounded on the west by the Wood River, the south by the Pawcatuck River, and the East by the Queen-Usquepaugh River. The Beaver River crosses the town from north to south. Significant portions of these rivers' corridors lie within protected open space / conservation lands. Existing land use and zoning reflects low density residential use overall, with more intensive land uses in the historic villages of Alton, Bradford, Carolina, Kenyon, Shannock, and Wyoming. Richmond's Comprehensive Plan explicitly supports the nomination of the study rivers to the NWSR system. Overall the plan and regulations provide very good protection of the rivers and associated ORVs.

Plans

The Richmond Comprehensive Plan is a recent plan approved by the Town Council and accepted by the State. The importance of the rivers to the town is frequently repeated throughout the plan. The plan notes that the Town is bounded on the west by the Wood River, on the south by the Pawcatuck River and on the east by the Usquepaugh River. The plan says that the rivers are essential to the character of the community. It says:

> *Historically, the people of Richmond benefited greatly from the use of the fresh water rivers and streams that make up the Town's borders. Horseshoe Falls in Shannock was used by the Narragansett's for fishing long before the arrival of European settlers. Later, the Wood, Pawcatuck, and Queen's Rivers powered sawmills, gristmills, iron works, and eventually textile mills. The population clusters in these areas eventually grew into the villages of Wyoming, Woodville, Alton, Kenyon, Arcadia, Hope Valley, Shannock, and Carolina. The Hillsdale, Usquepaug and Wood River Junction settlements were also established on smaller waterways. Today, many of the original structures within these mill villages remain intact, providing the Town with an impressive array of historically significant sites, such as those found within the Carolina Village Historic District and the Hillsdale Historic and Archeological District, both of which are included on the National Register of Historic Places.*

The plan includes the results of a Community Survey and Workshop comments. Many of the citizens responding to the survey cited the rivers as important resources for the community that are critical to the character of the community. The comments also indicate there is widespread support for enhancing and protecting the rivers through protection of riverfront property.

The Plan, at page 12, specifically states that the Town supports a National Park Service designation of Wild and Scenic River for a portion of the Wood-Pawcatuck Watershed citing the importance for protection of groundwater.

The Open Space and Recreation section of the plan notes that the town is a "regional provider of open space and recreational opportunities" and specifically cites canoeing, kayaking, and fishing along the rivers as examples of the opportunities that attract people to Richmond from all over New England. It says the Town should consider "geotourism" or "Cultural Heritage Tourism" with an emphasis on exposing visitors to the unique local natural and historic resources of an area.

Several of the policies and action items in the plan specifically reference the rivers and their

watersheds. Examples include:

> *Policy OSR4: Increase public access opportunities to natural areas, including water bodies, river and stream corridors, and hiking trails.*
>
> *Action OSR13: Support RIDEM efforts to acquire key tracts that will connect existing protected parcels for the combined purposes of hunting, hiking, greenways, rivers, and wildlife corridors*
>
> *Policy NC1: Limit the development of environmentally sensitive areas.*
>
> *Action NC1: Determine compatible land uses, and develop land acquisition and management programs to identify and procure open space along river corridors.*
>
> *Action NC4: Amend the Subdivision, Planned Unit Development, and Development Plan Review regulations to include 300-foot buffer zones along major rivers, which are restricted by voluntary conservation easements.*

The plan encourages not only local action, but also pledges the town to regional efforts to protect important resources. Specific features and areas of the Richmond landscape listed as of regional significance include the Wood-Pawcatuck Watershed. The plan says:

> *The Wood Pawcatuck it is the most natural and scenic river system of canoeable size in southeastern New England. The combined length of the two rivers is 53 miles, major portions of which have been included in the Nationwide Rivers Inventory of natural and undeveloped rivers throughout the Country identified for protection under the National Field and Scenic Rivers Act. In Richmond, a six and ½ mile stretch of the Pawcatuck River from the Wood River in Alton to a point where it meets the Usquepaug River in the Great Swamp is included in the National Inventory. The undisturbed nature of the river corridors lands in many ways contributes to its water quality, abundant fisheries, and extensive wildlife habitat. While most of the manufacturing formerly active along the rivers has now ceased operations, the majority of older mill housing and villages associated with these businesses are still occupied.*

The plan recommends designation as a Wild and Scenic River, saying that will provide added federal protection to the Watershed through National Parks Service review of federal projects. It may also provide additional funding for management projects and open space purchases by giving priority to purchases near or adjacent to the rivers.

Map 13, the Future Land Use Map shows lands along the rivers as reserved for low density, open space, and aquifer protection purposes. As noted above, the plan encourages establishment of a 300' buffer along the rivers to sustain native brook trout populations and other unique and/or rare species and for the protection of the water quality not only of the Wood and Pawcatuck Rivers but also the streams that feed into it. It notes that most of the property adjacent to the Wood River is privately owned. It encourages the Planning Board, where opportunities exist during preapplication plan review, to consider establishing the buffer within required open space or as voluntary conservation easements to create a continuous river/stream corridor in the Watershed.

Finally, the plan recognizes that a sufficient and dependable supply of water is critical to the Town's future development and that aquifers associated with the rivers supply most of the water for the town's private wells. The most productive aquifer areas are the central parts of the river valleys where the saturated thickness and water transmitting capacity of the sediments are greatest. Areas listed as critical to future water supply include the "Chipuxet, Usquepaug-Queen's, Beaver-Pasquisset, Upper Wood, and Lower Wood" basins. The plan says that, in addition to providing drinking water, these ground and surface waters sustain thriving ecosystems and aquatic base flows, as well as supporting domestic, industrial, and fire suppression needs.

Zoning

The Richmond Zoning Ordinance, like the Comprehensive Plan, seeks to protect the rivers by limiting development of adjacent lands. According to the Zoning Map, most of the land along all three rivers is zoned R-3 for low density residential development, requiring 3 acres of land per dwelling unit. Exceptions occur within the historic Mill Villages of Wyoming, Carolina, Shannock, Alton, Wood River Junction and Kenyon. There, the ordinance recognizes existing higher development densities and industrial uses, but otherwise is R-2, requiring a 2 acre minimum area per dwelling unit.

In addition, the ordinance provides for overlay districts, including an Agricultural Overlay District, Aquifer Overlay District and a Flood Hazard Overlay District that provide additional protections. The purpose of the agricultural overlay district to preserve large contiguous areas of prime agricultural soils for farming uses by requiring subdivision and development methods that create large farm lots intended for both agricultural and residential use. Because many of these large farm tracts are located along the rivers, this ordinance also helps protect the rivers.

Similarly, the Aquifer Protection Overlay District seeks to protect, preserve and maintain the quality of the groundwater that provides a substantial portion of the town's water supply through regulation of certain land uses and activities in the areas over the groundwater reservoirs and recharge areas. Because the aquifers and recharge areas are closely associated with the rivers, the water quality protections afforded to the aquifer by the overlay are also extended to the rivers.

The Flood Hazard district assists the town in complying with the requirements of the National Flood Insurance Program (NFIP) and helps limit the damage done by periodic flooding of the rivers. In doing so, it also protects the rivers from adverse impacts of flooding such as impacts of erosion and sedimentation, contamination from flooding of residential, commercial and industrial properties served by septic systems, and the impacts of flood debris on the river systems.

The Zoning Code also includes innovative development zones including a provision for Cluster Development (18.41) that allows development to be concentrated on one part of a property to protect important resources on another part of the property and a Planned Unit Development Village Center District (18.42) that allows mixed uses and provides flexibility for development in the historic mill villages along the rivers.

The ordinance at 18.30 establishes conditions for Special Use Permits. Included among them are sections that regulate domestic livestock to protect wells and surface waters, regulations on manure stockpiles within 200' of wells or wetlands and sets specific guidelines for composting

operations and energy facilities relative to wetlands.

Land Development

Richmond's Land Development Regulations specifically include among their purposes "the protection of interconnected networks of open space and greenway systems" The regulations require all development to follow LID principles, including maintaining natural drainage flow patterns, minimizing land clearance, clustering buildings, and minimizing impervious surfaces "to the greatest extent practicable." The regulations, at Section 13.2, require developments to be designed to avoid adversely affecting ground water and aquifer recharge, to reduce cut and fill, to avoid unnecessary impervious surfaces, to prevent flooding, to provide adequate access to lots and sites, and to mitigate adverse effects of shadow, traffic, drainage, and utilities on neighboring properties. Further, to the greatest extent practicable, developments have to be designed to maintain or replicate the existing hydrology on the site through use of small-scale controls integrated throughout the site to manage runoff as near as possible to its source.

Within the regulations "Land Unsuitable for Development" is defined to specifically include wetlands. The regulations allow the inclusion of wetlands when determining gross lot area, but do not allow inclusion of wetlands and waters in determining development density. The regulations require that site plans identify the site context to include relationship between the development site and wetlands, or more specifically, "Unique or fragile areas, including freshwater wetlands and vernal pools." 13.2.3.1.

Section 13.12.2 provides that "Existing wetlands shall not be used for stormwater treatment. However, where groundwater and surface water hydrology permit, and conditions favor creation of functional wildlife habitat, creation of wetland stormwater systems is encouraged." Subsection (h) says that "Natural drainage patterns shall be maintained and existing watercourses shall be left open wherever practicable."

Special Resource Protection

The Richmond town Code, at 8.06.020 defines a Watercourse as "Any river, stream, intermittent stream, or channel, whether natural or built, that flows long enough during the year to develop and maintain defined channels, and generally has flowing water at times other than those periods immediately following storm events."

Richmond has an Erosion and Sedimentation Control Ordinance (15.06) that requires a soil erosion and sedimentation control plan for every land development project, every subdivision, and every development plan within the authority of the Planning Board. The town also has an Earth Removal Ordinance (15.16) that puts very specific limits on earth removal projects such as quarries and gravel pits to protect air and water quality, reduce erosion and prevent sedimentation in and around excavated areas.

Recommendations

- Revise Comprehensive Plan Natural Resources Map and Land Use Plan Map (13) to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards in development regulations.

5.1.6 South Kingstown

A large area of central and northwestern South Kingstown includes the Chipuxet River and segments of the Queen – Usquepaugh and Pawcatuck Rivers. A significant portion of these rivers' watersheds in South Kingstown are dedicated open space, principally the RIDEM Great Swamp Wildlife Management Area and Worden Pond. Most of the watershed area that is not dedicated open space is developed at a low density with the exception of the University of Rhode Island and its surroundings. Town zoning reflects this existing pattern of development. There is potential for new residential development in the watershed but town planning, zoning and land development regulations suggest new growth will occur in a controlled manner that protects the rivers' free flow condition, water quality and their ORVs.

Plans

The Town of South Kingstown Comprehensive Community Plan (2014) is a relatively recent plan that follows the format and requirements in place prior to the current RI Statewide Planning Program guidance. However, it appears to meet current guidance in most respects.

The plan provides a town-wide vision for its future land use:

> *South Kingstown will continue to be a village-based, rural tradition residential community with three primary assets: involved and proactive citizens with diverse socioeconomic backgrounds, a rich historic and prehistoric legacy, and abundant natural resources. The Town will endeavor to maintain a sustainable quality of life that limits growth based on the capacity of natural resources and public infrastructure. …*
> *The Town will embrace the needs of residents, students, and tourists in environmentally and culturally sensitive sustainable development. …*
> *The Town recognizes the importance of protecting open space to maintain its natural and cultural resources, … and will restrict development to appropriately scaled construction in compliance with the Comprehensive Plan.*

LU Goal 2: To maintain a sustainable rate of development which is consistent with the ability of the Town to provide essential services, to achieve a stable tax rate, to protect environmental, historic, and cultural resources, and to provide a healthy environment.

Policies and implementation strategies related to this goal include evaluation of cumulative impacts to natural resources, infrastructure management, development phasing and annual growth analysis.

LU Goal 3: To promote and require high standards of development to preserve and enhance the quality of life, to encourage a sense of community, to support a healthy, walkable environment and to protect the natural resources of the Town.

Policies and implementation strategies related to this goal include environmental impact analysis of new development (natural & cultural resources, recreation, etc.), improving the town's ability to perform critical review of development proposals, and a LID approach overall.

These and other goals / policies in the plan promote the concentration of new development

in historic villages ("village-centric approach) as a means of managing growth and protecting natural resources. The village of Usquepaugh lies alongside the Queen - Usquepaugh River in the northwest part of town.

The plan offers protection of the study rivers with various mechanisms including designated greenways. "Greenways are shown on Map 2.3 Land Use Plan Map as following the Saugatucket River, the Queens River, and the Chipuxet River corridor linking Hundred Acre Pond, Thirty Acre Pond, Great Swamp and Worden Pond." Note however that the referenced map does not actually depict a greenway on the Chipuxet River.

Map 2.3 shows South Kingstown's vision for future land use; in addition to these Greenways, this map depicts medium density residential growth in a small area of Usquepaugh along the river, and medium and high density residential development in the villages of West Kingston and Kingston (URI remains the most intensive use in the Kingston village area). The village of West Kingston also includes the existing industrial zone near the railroad station. Otherwise, the subject river watersheds are planned for open space, low density (<1.09 DU/ac.) residential uses, and four major areas of medium density (1.09 to 1.99 DU/ac.) residential use. The Land Use Plan map shows the historic villages of Usquepaugh and West Kingston with the highest intensity uses along the study rivers; otherwise the river corridors are shown with dedicated open space or low density residential uses (except for a small strip of government / institutional land between Route 110 (Ministerial Road) and the Chipuxet River south of Route 138 and north of the Great Swamp Management Area).

The Plan's Economic Development element vision statement supports thoughtful, measured economic growth, concluding "Economic development initiatives intended to improve the economic quality of life for town residents must also protect our natural and cultural resources." This element highlights the need to:

- *Recognize the unique strength of South Kingstown's tourism economy related to the ocean front beaches, rivers, salt and freshwater ponds, and other natural resources.*
- *Continue to protect South Kingstown's valuable historic buildings and structures to support the tourism economy.*

The plan's Economic Development goals and policies are consistent with resource preservation in the subject watersheds. For example:

ED Goal 2: To identify constraints to economic development that must be considered by local boards and commissions, the local business community and/or future investors.

Policy 2.4 – The Town supports balancing economic development with the need to protect natural, cultural, historic, and recreational resources throughout the community.
Implementation

- *The Town shall continue to compare the adequacy and ability of local and state infrastructure (roads, drainage systems, water, sewer, etc.) to support future economic development with build out analyses developed by the Town. Comparisons will include an assessment of development potential against the capacity of our public water supply and stormwater system.*

Economic development goals and policies also support managed growth of designated village centers, including a specific plan for development of West Kingston in anticipation of infrastructure improvements and better linkage of the village with URI. Regulatory revisions and new design standards are promoted as a means of increasing the viability of village centers.

The Comprehensive Plan's Natural and Cultural Resources element highlights the abundant and diverse resources of the town as integral to the town's rural character and its vision for the future. The plan notes that biological diversity in South Kingstown is greater than any other RI town based RI Natural Heritage Program data. The Chipuxet River aquifer is a sole source aquifer and vital water supply to area residents and businesses. The plan acknowledges risks to the study rivers' watersheds:

> *Some of the primary threats to the Town's natural and cultural resources include:*
> - *Potential degradation of groundwater supplies and potential draw down of the aquifer;*
> - *Development adjacent to wetlands that has the potential to impair surface and groundwater quality;*
> - *Loss of natural wildlife corridors for many indigenous species, including those federally protected and those recognized by the RI Natural Heritage Program;*
> - *Insufficient protection of historic resources outside of the Historic Zoning Overlay; and*
> - *Vulnerability of cultural landscapes to future development.*

Town natural and cultural resource goals, policies and implementation actions relevant to the study rivers are listed below. Note however that statutory changes to the state's freshwater wetlands act in December 2015 may invalidate some local initiatives related to wetland protection once the implementing regulations are adopted.

NCR Goal 1: To protect and to preserve the quality and quantity of the Town's potable water supply.
Policies and implementation strategies call for a town-wide and region-wide approach to protection of both groundwater and surface water, with increased efforts to mitigate non-point source pollution and continued evaluation of the town's Groundwater Protection Overlay District effectiveness.

NCR Goal 2: To protect and to preserve both freshwater and coastal wetland resources.

> *Policy 2.1 - The Town will work toward protecting the integrity of the varied wetlands which serve many important ecological and economic functions. Protection efforts will be directed toward swamps, marshes, bogs, floodplains, rivers, streams, ponds, wet meadows, aquatic beds, beaches, and all other wetlands as defined by DEM Freshwater Wetlands Act, April 1998, as amended. The Town will pursue both regulatory and non-regulatory options for ensuring the protection of these resources.*
> *Implementation*
> - *The Town shall work with DEM to establish the regulatory right of the Town to deny and / or condition Freshwater Wetlands Permits based on compliance with the Comprehensive Plan.*
> - *The Town shall implement recommendations of its RI Pollutant Discharge Elimination System (RIPDES) Phase II Stormwater Management Plan.*

- *The Town shall adopt a wetland protection ordinance to protect specific areas identified as critical wetland resource areas.*
- *The Town shall adopt a river corridor overlay protection district to protect: a) the wildlife habitat associated with the rivers; b) the scenic, rural quality associated with the rivers; and c) the water quality of the rivers.*
- *The Town shall develop a freshwater ponds and lakes management plan to address such issues as docks, public access and land use in the watershed.*
- *The Town shall develop a system to track the state wetland permits to identify areas of wetland disturbance and to monitor compliance with local and state approval conditions.*
- *The Town shall develop a wetlands protection checklist for development proposals. This would formalize recommendations made in the RI Soil Erosion and Sediment Control Handbook (1989), as amended, and the DEM Stormwater Design and Installation Standards Manual (2011), as amended. The checklist shall be used by the Conservation Commission and Planning Board to ensure a consistent wetland protection policy.*

Policy 2.4 - The Town will work toward developing corridors of open space throughout the Town to ensure the protection of rivers, st[r]eams, wetlands, agricultural lands, scenic features, groundwater reservoirs and recharge areas, and wildlife habitat.

- *The Town shall continue to support the concept of corridor zoning to provide for a conservation zone or greenway along selected rivers within the Town, in order to both maintain the rural character of the Town and to protect river resources.*

NCR Goal 3: To protect and preserve agricultural land within the Town.

NCR Goal 4: To protect and to preserve other natural resource areas within the Town.
Policies and implementation items relate to preservation of trees and forests among others.

NCR Goal 5: To expand the measures available for protecting cultural resources to provide maximum protection to South Kingstown's historic and prehistoric resources.
Policies and implementation items include expansion of the inventory of resources, expansion of the Historic Overlay District, updating District regulations, and review of cultural resource impacts of development proposed outside of designated Historic Overlay Districts. The plan also proposes measures to preserve scenic landscapes (viewscapes) of cultural importance, including preservation of historic village characteristics.

The plan's Services and Facilities element provides strong commitment to managed growth, low impact development, and protection of water resources. Modest sewer service and water service expansions are proposed for the villages of Kingston and West Kinston within the state designated Urban Services Boundary (USB). Planning and management of public water facilities is emphasized along with associated groundwater protection. Water resources are also to be protected through stormwater management. Continued implementation of the Onsite Wastewater Management Ordinance is recommended, along with other measures to mitigate OWTS impacts to water resources.

The Comprehensive Plan's Open Space and Recreation Action Plan promotes provision of rec-

reation services/opportunities and preservation of open space with certain goals and policies relevant to the study rivers:

OSR Goal 1: To acquire land for open space and conservation in order to maintain the rural character of the community.
Policies and implementation strategies include continued acquisition of open space and recreation land, application of a watershed approach in planning, and consideration of connectivity and access. In particular:

> *Policy 2.1 – To create a system of greenways throughout town to protect and preserve open space and natural resources, to ensure the connectivity of these resources, and to increase accessibility for all residents.*
> *Implementation*
>
> - *The Town shall encourage accessible open space and recreation facilities within walking distance of all homes in the community to support a healthy living environment.*
> - *The Town shall preserve the following greenways which follow natural geologic or geographic features: …. Chipuxet River corridor (Hundred Acre Pond - Thirty Acre Pond – Great Swamp - Worden Pond), Queens River corridor, …*
> - *The Town shall continue to ensure that identified greenways will be protected from the adverse effects of future growth and development through the zoning ordinance and subdivision regulations, land use policies, and open space acquisition.*
> - *The Town shall continue to implement its Greenways Master Plan.*

The plan also promotes access to public open space, conservation, and recreation areas, including provision of ADA accessible facilities.

The Comprehensive Plan contains an element focused on URI. Of particular importance to the protection of the Chipuxet River is:

URI Planning Goal 4: Preserve Open Space, Provide for a Sustainable Campus Environment and Enhance Natural Systems Protection.
Policy 4.1 – To protect wetlands and surface and groundwater resources associated with the Chipuxet Aquifer, the Town supports, encourages and expects that the University will utilize best management practices for drainage handling and soil and sedimentation control all capital improvement projects, campus renovations and infrastructure management.

The plan also calls for more cooperative planning efforts between the town and URI, including master planning of URI properties north of Flagg Road near Hundred Acre Pond and the Chipuxet River.

Zoning

South Kingstown's zoning ordinance is Appendix A of the town code. The town zoning map provided online was consulted in regard to the existing zoning along the study rivers and their watersheds. Zoning districts along the Queen – Usquepaugh River and Chipuxet River segments are primarily Open Space and residential uses with minimum lot sizes of 80,000 s.f. (R80 and R120 zones). Some residential zones with higher allowed densities occur in the historic village

centers of Usquepaugh and West Kingston near the subject river segments. Within the subject watersheds, Open Space and low density residential zones predominate, although some industrial zoned land occurs along the railroad in West Kingston, and some commercial land is zoned in the village of Kingston. URI properties zoned as Government and Institutional abut the Chipuxet River near West Kingston and dominate the Chipuxet watershed to the northeast.

The zoning ordinance also specifies several overlay districts which provide additional protection of the rivers' ORVs:

> *Sec. 102. - Overlay and special management districts.*
> *These are districts that are superimposed on existing zoning district(s) or part of a district, and impose specified requirements in addition to, but not less than, those otherwise applicable for the underlying district(s).*
> *A. Historic Overlay District. This overlay district includes an area within the Village of Kingston designated as an Historic District and is on the National Register of Historic Places. It is covered by special zoning restrictions which apply to all structural exterior building changes, street or traffic improvements, landscaping, erection of signs, and removal of trees.*
> *C. Groundwater Protection Overlay District. This is an overlay district which is superimposed over any other zoning district in order to provide additional controls to protect groundwater and interrelated surface water resources.*

As indicated, the one existing Historic Overlay District is in the village of Kingston (although the Comprehensive Plan calls for expansion of this overlay district to other sites in town).

The Groundwater Protection Overlay District (GPOD) includes RIGIS mapped groundwater reservoirs and associated aquifer recharge areas designated by RIDEM as Class AA groundwater (Comprehensive Plan Map 5.5). The GWPOD includes all of the Queen – Usquepaug River segment and all of the Chipuxet River segment that lies outside the Great Swamp Management Area. The GPOD covers most of the Queen-Usquepaugh River watershed and large portions of the Chipuxet River watershed in South Kingstown. The GPOD ordinance prohibits a number of land uses considered a threat to groundwater quality such as automotive – related businesses and most underground storage tanks; agricultural uses are not prohibited however. The ordinance specifies certain design site standards such as those related to stormwater management, storage tanks, solid waste management, earth removal, and OWTS.

Note that the town's floodplain overlay district is adopted in the town code of ordinances chapter 21, and is not identified as an overlay district per se in the zoning ordinance (Appendix A of the town code). The floodplain overlay district is described below under Special Resource Protection. The floodplain overlay district is not to be confused with the High Flood Danger (HFD) Overlay District described in the zoning ordinance – the HFD Overlay District relates to coastal flooding outside the study area.

South Kingstown's zoning ordinance section 504 requires a special use permit where an OWTS is to be located within 150-feet of a wetland, including the study rivers. This special use permit requirement will be invalidated once the RIDEM regulations implementing the 2015 statutory changes to the state wetlands act are implemented.

Section 510 of the zoning ordinance relates to solar energy systems. "The standards are intended to ensure that solar energy systems are compatible with the surrounding area, provide for public safety, and minimize impacts on scenic, natural, and historic resources." Requirements intended to limit vegetative clearing and protect scenic viewsheds are included.

The zoning ordinance also identifies certain stormwater management and soil erosion and sedimentation control requirements, and references the town's Subdivision and Land Development Regulations (Table 1).

Land Development

The Town of South Kingstown, R.I. Subdivision and Land Development Regulations (2012) provide specific procedures and requirements for subdivision of land. The procedures follow the general format set forth in state enabling legislation. The regulation's authority and intent (Section I), general requirements (Section III) and special requirements (Section IV) are clearly oriented towards managed growth, low impact development, and resource protection. Section XIII. Design and Public Improvement Standards, and Section XIV. Construction Methods and Specifications provide details on requirements related to flood hazard protection, stormwater management and soil erosion and sediment control among others. The town also promotes residential development in keeping with the South Kingstown Residential Design Manual (1999).

Special Resource Protection

Special resource protection in the subject watersheds is implemented primarily through the zoning ordinance, including the Historic Overlay District and Groundwater Protection Overlay Districts described above.

Stormwater Management
Chapter 20 of the town code, Stormwater Management, sets forth the regulations for town compliance with the "RIDEM RIPDES General Permit for Stormwater Discharge from Small Municipal Separate Storm Sewer Systems and from Industrial Activity at Eligible Facilities Operated by Regulated Small MS4s". It specifies prohibited discharges to watercourses and stormwater drainage systems, identifies BMP requirements, and property owner requirements regarding watercourse protection. Article II of Chapter 20, Soil Erosion, Runoff and Sediment Control, specifies that anticipated land disturbances of 1,000 s.f. or more, any such disturbance within 200-feet of a watercourse, or any such disturbance resulting in steep slopes (10% or more) must first receive a determination of applicability from the building official. "Upon determination of applicability, the applicant shall submit a soil erosion, runoff and sediment control plan for approval to the building official or to the planning board as provided in section 20-54." The specifications and procedures for submission, review and approval of this plan is set out in the remainder of this chapter.

Floodplain Management and Flood Hazard Overlay District
Chapter 21 of the town code, Floodplain Management, sets forth the regulations for town compliance with requirements of the National Flood Insurance Act and Program.

> *The special flood hazard areas are herein established as a floodplain overlay district. The district includes all special flood hazard areas within the Town of South Kingstown*

designated as zone A, AE, AH, AO, A99, V, or VE on the Washington County Flood Insurance Rate Map (FIRM) and Digital FIRM issued by the Federal Emergency Management Agency (FEMA) for the administration of the National Flood Insurance Program. … The exact boundaries of the district may be defined by the 100-year base flood elevations shown on the FIRM and further defined by the Washington County Flood Insurance Study (FIS) report … The office of the building official is responsible for floodplain management. The FIRM and FIS report and any revisions thereto are incorporated herein by reference and are on file with the planning department and building official.

Chapter 21 describes permit requirements associated with development in this overlay district.

Recommendations

- Revise Comprehensive Plan Land Use Plan Map 2.3 to show Chipuxet River Greenway described in the plan.
- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.
- Incorporate scenic river guidelines / standards in development guides and village plans.
- Evaluate town plans and regulations potentially affected by the state freshwater wetlands act (December 2015) and evaluate associated RIDEM regulations once they are presented for public comment.

5.1.7 West Greenwich

West Greenwich includes segments of the Wood River and Queen River. The Wood River watershed covers most of western West Greenwich, and the river corridor there is almost entirely within protected conservation land (largely the RIDEM Arcadia Management Area). Other existing uses and future plans reflect low density residential uses in that watershed. The Queen River corridor is well protected by protected conservation lands, with the exception of an industrial zoned tract at the southeastern corner of town. Proposed future development focuses on intensification of uses along I-95 and certain villages. Overall the town's plan and regulations provide good protection of the river corridors and ORVs.

Plans

The West Greenwich Comprehensive plan was written in 1995 and amended in 2004, 2006, 2007 and 2008. The 2004 amendments created a Special Management District (SMD) at Exit 7 and added an Affordable Housing section to the plan. The 2006 amendments created a Corporate Zoning District. The 2007 amendments revised the Special Management District and the 2008 amendments set Senior Residential Development goals. The state lists the approval status of the West Greenwich plan as "denied" presumably because the plan does not conform to state requirements. The town has been updating the plan for several years and has made both the original, and parts of the proposed update, available on-line.

This is an old plan, prepared to the standards of a different time. However, it still contains valuable information and, being locally approved, it still has some validity. The plan recognizes the importance of the Pawcatuck River Watershed to the community. In Natural Resources, it devotes roughly half a page to explaining what a watershed is. It then provides a map of watersheds in West Greenwich, and discusses the Pawcatuck specifically. It says:

> *The Pawcatuck Watershed is located in southwestern Rhode Island and portions of southeastern Connecticut, encompassing ten Rhode Island towns and four Connecticut towns. Total acreage of the Pawcatuck Watershed is 194,000 acres. The Pawcatuck Watershed is drained by seven major rivers and their tributaries: the Chipuxet, Chickasheen, Wood, Queen and Pawcatuck Rivers of Rhode Island; and the Shunuck and Green Fall Rivers of Connecticut.*

It also discusses wetlands, flood plains and rare species habitats within the watershed. Goal 3 in this section says: "Develop water resource management strategies designed to preserve lakes, ponds, rivers, wetlands and associated buffer strips." Goal 4 says: "Protect ground water resources and recharge areas used for existing and potential public water supply from contamination from point and non-point pollution sources."

Many of the policies articulated by the plan pertain directly to water resources. Policy P3 says: "Prohibit direct storm water discharges from all development into lakes, ponds, streams or wetlands." P6 says: "Ensure protection of wetland systems recognized as valuable natural resources that provide functions of flood storage, water quality protection, wildlife habitat, recreation, and pollution control by requiring compliance with provisions of state law and local ordinances." P8 says: "Promote the Town of West Greenwich as a regionally significant GREENWAY as the Town is located amidst adjacent communities that have formed a large greenbelt separating

urban areas."

Some of the policies anticipate future actions with the potential to affect water resources. P16 recommends changes to the zoning and subdivision regulations to require applicants to identify "natural resources and constraints to development" as part of the application process and to establish a Development Impact Statement (DIS) for certain types of development projects. P18 recommends authorizing cluster development and altering setbacks to protect natural resources. P18 encourages formation of the municipal land trust to "acquire and receive donations of land to be preserved for the public good."

Under Goal 4: Groundwater Protection, four actions are recommended: 1) Develop a comprehensive local groundwater protection strategy. 2) Consider zoning ordinance and map amendments to include an aquifer protection overlay district. 3) Develop an inventory of potential contamination sources, and 4) Amend the Zoning Ordinance to prohibit hazardous waste generators from polluting groundwater quality for potential public wells.

In the Open Space and Recreation chapter, the plan acknowledges the link between rural character and public open space. It says: "The sense of openness in the Town is due to large areas dedicated to public use in the form of the Arcadia Management Area, the W. Alton Jones Campus of the University of Rhode Island, the Big River Reservoir property, Wickaboxet Management Area, Beach Pond State Park and other public lands." The plan provides specific discussions for each of these publicly owned areas.

The discussion of Acadia notes the large amount of conservation land, the diversity of habitat types, and the benefits of state control. It also says: "The Wood River, one of the finest trout streams in the state and Rhode Island's best example of a scenic and wild river, flows through the management area. Primary tributaries to the Wood River include the Falls River, Flat River, Parris Brook and Roaring Brook, all found within the management area."

The Future Land Use Map shows the vast amount of open space and public land referred to in the previous sections. Most of the rest of the town is shown as low density residential and greenbelt overlay except for land along I-95, certain designated "special planning areas" for possible location of neighborhood businesses, and a few "Special Area Management Plan / Mini-Plan" areas.

Zoning

The West Greenwich Zoning Ordinance establishes six zoning districts within the town. These include residential uses: RFR-2 (2 acres), RFR-1 (1 acre), Open Space and Public Land (OSPL), Neighborhood Business (NB), Highway Business (HB), Industrial A (IA) and Industrial B (IB). Later amendments added the Exit 7 Special Management District (SMD) and the Senior Residential District (SMD) and provides standards for development in each of these districts. The ordinance also provides for Residential Compounds and Conservation Design Development.

The use tables are quite extensive, with an exhaustive list of prohibited and permitted uses. Article X regulates extractive industries (gravel pits, quarries, and certain types of agriculture). Multi-family development is allowed, but Section 13 places limits on the number of bedrooms (20) that can be served by a single septic system. Article VII in the amendments provides the

town's Growth Control Ordinance which provides building quotas designed to control growth to within limits that can be accommodated by town infrastructure and natural resource constraints.

The Zoning Map is represented on most, but not all of the 60 plat maps, making it difficult to see the relationship between zones across the whole town. However, the pattern roughly corresponds to the Future Land Use Map in the Comprehensive Plan, with large areas of Open Space and Public Land surrounded by Rural Farm Residential Zoning. RFR-2 is the "default" zone and the ordinance states that, where the zoning district is not identified on the plat map, it is RFR-2.

Land Development

The West Greenwich Subdivision and Land Development regulations date from 1995, but they have been amended numerous times between 2000 and 2015. Section III defines land unsuitable for development to include:

> *a. Fresh water wetlands, not including areas subject to storm flowage (ASSF), but, including that area of perimeter wetland within fifty (50) feet of the edge of any bog, marsh, swamp or pond; and any applicable 100-foot or 200-foot riverbank wetlands, as defined by Rhode Island General Laws Section 2-1-20 (1987), as amended; and drainage facilities.*
> *b. Areas within a 100 year flood zone, as defined by FEMA*
> *c. Land within any existing and proposed easement areas for utility use, access, or drainage, and*
> *d. Historical cemeteries*

This section also requires that: "a minimum of seventy percent (70 %) of the minimum lot size in each zoning district shall be contiguous suitable and shall be accessible from the lot's frontage for the development site." Applicants are required to identify natural resource areas on their plans including:

i. *Natural waterways and water bodies, particularly those which could be susceptible to sedimentation or erosion (e.g. lakes, ponds, rivers, streams, wetlands, etc.);*
ii. *Man-made waterways and water bodies, including detention basins, retention basins, catch basins and other drainage system inlets, etc.);*
iii. *Areas particularly susceptible to erosion due to soil type,*

Applicants are also required to site buildings in such a manner that these resources are protected whenever possible. The ordinance includes requirements for Erosion and Sedimentation Controls and requires Storm Water Management Plans for major developments. Developers are strongly encouraged to use structural SMP measures which promote volumetric mitigation in addition to peak flow rate mitigation, specifically by means of stormwater infiltration, where practicable based on soil types and depth to groundwater table.

Section C discusses dedication of public land and requires that: "The Planning Board shall require all land developments and subdivisions subject to the provisions of Section 2 below, to dedicate a portion of the buildable land being subdivided for the purpose of providing open space, conservation, park and recreational facilities to serve present and future residents of the proposed land development or subdivision." It also provides that: "The Planning Board may, in

its discretion, require the payment of a fee in-lieu of land dedication, or a combination of land dedication and payment of a fee, as an alternative to the dedication of land."

Special Resource Protection

Ordinance 40 establishes a Conservation Commission and sets it purposes as:

a. To promote and develop the natural resources
b. To protect the watershed resources
c. To preserve natural esthetic areas within said municipalities [sic] and
d. To conduct researches [sic] into its local land areas and shall seek to coordinate the activities of unofficial bodies organized for similar purposes.

Ordinance 67 establishes the West Greenwich Land Trust "for the purposed [sic] of acquiring development right [sic] to real property within the town as well as the acquisition of real property, or interest therein, to preserve agricultural, recreational, historical, or littoral lands, open spaces, fresh water wetlands, estuaries, and adjoining uplands, groundwater recharging areas, well fields, wildlife habitats, land for bicycle and hiking paths and land for future public recreational facilities and use."

Ordinance 79 is the Soil Erosion and Sediment Control Ordinance. This ordinance provides "teeth" for the requirements of the Zoning, Subdivision and Development Regulation's requirement for Erosion and sedimentation control and stormwater management plans.

Ordinance 90 Illicit Stormwater Ordinance prohibits discharge of untreated stormwater into the town's stormwater drainage system. This ordinance complies with the illicit discharge detection and elimination requirements of the RIPDES general permit (RIR040029) granting coverage under the General Permit for stormwater discharges in West Greenwich.

Recommendations

- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.

5.1.8 Westerly

The Pawcatuck River forms Westerly's northern and western boundaries, and most of the town north of Route 1 is within the watershed. The Pawcatuck River corridor includes significant areas of protected open space / conservation land from Chapman Pond east, and the watershed associated with this segment is largely expected to remain in open space and low density residential uses with the exception of development in Bradford Village. The river east of Chapman Pond is a mix of uses reflecting the river's historic past as a focus of commerce and development. The downtown riverfront area is densely developed and public water and sewer service are available. The river downstream is intertidal and the shorefront coastal in character. The town's Comprehensive Plan recognizes the importance of the river to many of the town's interests, and calls for a River Corridor Overlay zoning district to be enacted. The town's plan and regulations provide good protection of the river and associated ORVs.

Plans

Westerly is in the process of updating its Comprehensive Plan. The update is available in draft form but has not yet been adopted. The plan currently in force was adopted in February of 2010. This analysis focuses on the newer plan in the anticipation that it will soon be adopted by the Town and accepted by the State.

The plan cites the town's unique geography as key to the affection residents feel for the community. citing: "its spectacular location along the Pawcatuck River, Little Narragansett Bay, salt ponds and the Atlantic Ocean" as well as "the charm and history of its busy urban and quiet rural areas." The plan attributes Westerly's early settlement and prosperity to its location on a navigable stretch of the river, which led to early farming, fishing and shipbuilding activity and supported later industrialization.

The plan urges cooperation with surrounding towns to secure riverfront property and protect water quality. The Executive Summary says, somewhat ironically, that "The same river crossing and ocean front that originally brought settlers to Westerly now provide some of the biggest challenges to the sustainability and vitality of the quality of life developed here." This theme is carried forward into Chapter 2 which notes that: "A shore community subject to catastrophic storm surges, an urbanized downtown located on a coastal estuary, and an inland river subject to flooding require this community to include resiliency planning as part of any future land use discussion."

The Pawcatuck River continues to be an important economic driver for the community. In Chapter 3, Section 3.3.3 Economic Development, Westerly Landing, located along Main Street and the Pawcatuck River, is identified as a key economic development opportunity due to its riverfront location and river access.

Section 3.4 Natural Resources notes how dependent Westerly is on the Pawcatuck for water supply. It says: "Westerly's groundwater resources exist within three aquifers – Ashaway, Bradford and Westerly. These are all located within the Pawcatuck River Aquifer Region, which is the sole source of drinking water for the town." The plan recognizes the important role played by wetlands along the rivers, streams and ponds, because they remove nutrients, pollutants, and sediments from surface water runoff, recharge water supplies, reduce shoreline erosion and flood risks and provide fish and wildlife habitat.

Section 3.5.2 notes that the town has a sewer system and wastewater treatment plant that discharges into the Pawcatuck River as regulated by RIDEM. A major upgrade in biological nutrient removal capability was added to the plant in 2003 to reduce the potential for impacts to river water quality from algae "blooms" promoted by nutrient discharges. The plan says the wastewater treatment plant is functioning near treatment capacity but indicates that it has sufficient capacity for all currently proposed and approved subdivisions. The plan indicates that the town is working to limit the amount of groundwater infiltrating into the sewer system to reduce the amount of water currently being treated. It also says the treatment plant is designed so that its capacity can be increased by the installation of additional components.

Section 3.5.3 address stormwater management requirements. The town has a separate storm sewer system that discharges mostly to the Pawcatuck River. The plan says the town has established an ongoing maintenance program for the stormwater system that includes cleaning catch basins and pipes and replacing aging pipes and structures.

Section 3.7.7 addresses boats and water access. It says boats can be launched during the operating season at the Westerly marina. The marina is operated under a lease agreement between the owners and the Town and the boat launch is free to all Westerly residents. The RIDEM facility located on Main Street provides another free boat launch area with parking for boat trailers. In addition, the plan says there are several other marinas on the Pawcatuck River where boat ramps are available for a fee. The plan also indicates that Westerly has a Harbor Management Plan under development and predicts that its successful completion should help manage the growing activity within the Pawcatuck River and Little Narragansett Bay.

Section 3.8.3 lists recreation needs and expresses support for town and state efforts to establish greenways that follow the Pawcatuck River and the Town's coastline. This section says: "79 percent of respondents in the Westerly community survey agreed or strongly agreed that the riverfront should be developed with more greenspace. This finding implies that one of the key recreation focuses should be on the development of greenspace along the river [and] enhancing the efforts of the riverwalk project."

Section 4.1 articulates a vision for the future of Westerly, including the vision that:
"The shoreline, Pawcatuck River, salt ponds and greenspace will remain Westerly's trademark, carefully managed to sustain their uses while preserving their health and natural beauty for future generations to enjoy."

Section 4.4.6, Special Districts, calls for a River Corridor Overlay Zoning District. It describes the district as follows:

> *… an overlay district and zoning ordinance provisions that would provide protection to the Town's supply of drinking water, encourage appropriate redevelopment and economic growth and provide important recreational opportunities in town. Westerly needs a special river corridor overlay zoning district because the Pawcatuck River is vital to the continuing prosperity of the town. First, the river is connected to and provides water to the underground aquifer that is the primary source of water supply for Westerly. Second, land fronting on and near the Pawcatuck River in the downtown area will have an important role in continuing renovation and revitalization in Westerly. Third, the river provides*

important recreational opportunities for residents and tourists and affects the quality of habitat for fish and shellfish and other wildlife in the river and in Little Narragansett Bay.

The Goals, Policies and Actions section of the plan includes multiple goals and actions related to protection of the river and related natural resources. The importance of the river to the community is indicated by the pervasiveness of river related recommendations throughout the section. River resources are cited in Economic Vitality recommends encouraging efforts to recognize the continuing importance of the river in sustaining the local economy; Sustainable Natural Resources, which recognizes that Westerly is dependent on the watershed for water supply; Recreation which encourages improved access to the river and upgrades to existing access points; Transportation, which encourages use of the river and the harbor for water transportation to reduce traffic congestion; Energy, which encourages use of water power as one means to help meet alternative energy needs; and Natural Hazards which includes recommendations to reduce the potential for flood damage and reduce the potential for water quality impacts on the river from flooding of adjacent land.

Zoning

Westerly's current Zoning Code was originally adopted in 1998 and then readopted, with amendments in 2003. It provides definitions for water, watercourse, and for wetlands. The Zoning Code includes a title, at 260-56, for a River Corridor Overlay District, although the section is [reserved] indicating that it has not yet been developed or adopted. There is also a River Condominium Overlay District at Section 260.15E, also [reserved]. Aquifer Protection Overlay and Historic Mill Overlay districts are included in Sections 260-55 and 260-57.

Other related Zoning Districts include:

- *Marine Commercial - dedicated to marine (water-dependent) and marine-related uses consistent with the Rhode Island CRMC Program for waters designated Class 3, High-Intensity Boating.*
- *Shore Commercial - to promote the use of waterfront locations for servicing local and tourist seasonal businesses and water-related activities and provide for both direct and indirect access to the water by the public.*
- *Open Space and Recreation - for areas already in use as open space or for recreation. This district covers a variety of uses including conservation lands, the Town's well fields, and major parks and recreation areas.*

The Zoning Map shows that land adjacent to the river is zoned for a wide variety of uses, due to Westerly's historic pattern of development along the river. There is Open Space and Recreation (OS/R) land in the northeast corner of Westerly in Bradford, abutting Hopkinton. Moving down river, Zoning reflects the village settlement pattern, with Low Density Residential (LDR-40), Medium Density Residential (MDR-20 and MDR-30), and High Density Residential (HDR-15) uses leading to the Bradford Mill property. The mill property is zoned for Light Industrial (LI) use although most of it is presently open space.

Open Space and low to medium density residential uses abut most of the riverfront facing North Stonington. Low Density Residential (LDR-40) Rural Residential (RR-60) and Open Space and Recreation (OS/R) uses predominate. Land at the Cherenzia Quarry, facing both Stonington and

North Stonington, is zoned Light Industrial (LI) and land north and south of Route 78 is (OS/R). Thereafter, districts and densities increase entering "downtown" Westerly.

Zones in this area include Office Research, Assembly and Technology (ORAT), Downtown Business I (DB-I), Downtown Business II (DB-II), Neighborhood Business (NB) and General Industrial (GI). South of the "downtown" , the uses abutting the river are High Density Residential (HDR-6), Marine Commercial (MC), and General Industrial (GI). Avondale on the waterfront is mostly zoned Medium Density Residential (MDR-30 with some MDR-20). To the south, the Watch Hill neighborhood is mostly Low Density Residential (LDR-43) with Shore Commercial (SC-WH) in Watch Hill proper and Open Space / Recreation (OS/R) at the beach.

Land Development

Westerly's Land Development and Subdivision regulations specify the procedures by which proposals to subdivide or develop land are reviewed. The administration and procedures are consistent with the requirements of the state enabling legislation, providing for a three-step review process for major subdivisions and development projects; Master Plan, Preliminary, and Final.

Section A-261-15 defines land unsuitable for development to include freshwater wetlands (except RI "Perimeter" and "Riverbank" wetlands), coastal wetlands (except "Contiguous Areas") and areas within the one-hundred-year flood zone as defined by FEMA.

Development plans are required, at A261-30, to provide written and/or graphic analysis of "site context; geology and soil; agricultural lands; watercourses, wetlands; coastal features; topography; climate; ecology; existing vegetation, structures, and road networks; visual features; and past and present uses of the site." The regulations require that certain specific areas "shall be preserved as undeveloped open space or lot area, to the extent consistent with the reasonable utilization of land, and in accordance with applicable state or Town regulations". Resources to be preserved include: "Unique and/or fragile areas, including freshwater wetlands, associated buffers and coastal features including associated buffers and floodplains." The regulations require that proposals for development plans include an erosion and sediment control plan.

Special Resource Protection

Special resource protections, in addition to those noted above, include:

Chapter 5 Article III of the Westerly Town Code establishes the Westerly Conservation Commission and assigns them responsibility to gather and disperse information regarding natural resources, to make recommendations on the use and management of natural resources, and to work with the Town Council, Department of Public Works, and Planning Department to locate developments in a manner that protects natural resources.

Chapter 30 Establishes the Westerly Land Trust and invests them with authority to identify and purchase land for open space, own land, hold conservation easements, and serve as rights holders for acquisition of property development rights in Westerly.

Chapter 86 Boats and Waterways sets standards for operating boats on Westerly Waters, includ-

ing safety requirements, standards for marine sanitation, and pollution control. Section 86-30 makes it unlawful to jump off any bridge traversing any waterway within the Town of Westerly and establishes a fine of $50 for willful violations.

See also habitat related protections listed in Table 1.

Recommendations

- Revise Comprehensive Plan maps to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.

5.2 **Connecticut Towns**

5.2.1 North Stonington

North Stonington includes all of the Shunock River, and a large segment of the Green Fall River. The Pawcatuck River is the Town's southeast border with Westerly. The watersheds associated with these rivers covers the eastern portion of the town. The Green Fall River corridor and watershed are expected to remain very rural with a combination of conservation land, farms, and low density residential uses. The Shunock River north and west of Route 184 is likewise expected to remain rural, with the exception of the historic Village of North Stonington. Most of the Pawcatuck corridor is expected to remain undeveloped. Most intensive development is planned for the two I-95 interchanges in town, at the very southeast portion of town; the western interchange occurs where the Shunock flows into the Pawcatuck; the eastern interchange occurs at the state line near the Ashaway River. Existing regulations provide a good level of river protection in this southern area. Overall, the town's plan and regulations provide very good protection of river corridors and watershed ORVs.

Plans

Plan of Conservation and Development

The 2013 North Stonington Plan of Conservation and Development states the following as its overall goal:

> *The goal of North Stonington's 2013 Plan is to create a relationship between preservation and development by translating the selected themes of livability, sustainability, progress, and community into specific objectives to move North Stonington into the future in a sustainable manner.*

The plan groups subordinate goals and objectives into four major categories, the principal category relevant to the protection of the rivers and their watersheds is "Preserving the Environment and Rural Character"

Chapter 7 Natural Resources and rural Character provides the town's vision for conservation:

> *Conservation should be achieved through smart development choices, regulation enforcement, and thoughtful open space planning that protects and preserves natural and historic resources and our rural character. The presence of farms enhances sustainability and livability of the community by providing a quiet rural setting, economic opportunity, and healthy food choices. People define progress as moving toward a cleaner, healthier, protected environment, with opportunities to 'go green' and buy local.*

The plan inventories and maps a number of different natural resource constraints to development such as wetlands, steep slopes, and floodplains. It indicates that progress towards achieving conservation goals will be achieved through strict implementation of existing town regulations such as the inland wetland and watercourses regulations. It also cites implementation of the Plan of Conservation and Recreation Lands prepared by the Conservation Commission (Appendix C of the POCD).

Section 7.5 Water discusses the importance of surface water resources and groundwater re-

sources to the water supply needs of the town (also discussed in section 10.6 Water Infrastructure). The importance of wetlands for ecological, flood control, water quality, and water supply is described. The importance of groundwater protection is emphasized:

> *Nearly three-quarters of the town's residential population is served by private on-site wells. The Pawcatuck groundwater hydrologic system is a federally designated sole-source aquifer due to its vital importance in supplying drinking water to the town and region for both present and future residential and economic development needs. It encompasses the Shunock, Wyassup, Pawcatuck, Ashaway and Green Falls sub-regional drainage basins.*

The town has identified its Planning and Zoning Commission (PZC) the "Aquifer Protection Agency" required by DEEP to develop and implement land use controls to protect the DEEP delineated Level A Aquifer Protection Area north of Route 2. This Level A Aquifer Protection Area is relatively small, but critically located over the public water supply wellhead area on the Shunock River upstream of the village of North Stonington. The Level B aquifer protection area has not yet been defined by CTDEEP (see discussion below).

Section 7.6 Vegetation and Wildlife describes the importance of these biological – ecological resources, including the occurrence of 35 Critical Habitats and Natural Diversity sites identified by CTDEEP across the town. In addition, "The Fisheries Division [of CTDEEP] is especially interested in North Stonington's cold-water fish population in the Shunock River, a state-designated and managed wild trout stream."

Plan sections 10.6 Water Infrastructure and 10.7 Sewer Infrastructure are important to the rivers and their watersheds because this infrastructure exists in the watershed and may pose important limits to growth and development. Water is abundant and the POCD indicates modest water service expansion in the southern part of town. North Stonington does not have a wastewater treatment plant but a small area in the southern part of town is served by sewers which convey wastewater to the Town of Stonington for treatment and discharge through its treatment plant. The existing sewer service area occurs along I-95, nearby Route 2, and along the western half of the towns' border along the Pawcatuck River. Sewer expansion is not anticipated by the POCD although wastewater treatment alternatives were being evaluated by the town at the time the POCD was prepared.

Consolidated town goals, objectives and implementing actions are presented in Chapter 11 of the plan. The most important ones related to the rivers are:

- *Be proactive, responsive and deliberate in all planning efforts to better prepare for and manage the rate, style, and amount of change. (II.C.1)*
    - *Ensure that the built and natural environments reflect the heritage of North Stonington.*
    - *Create speculative master plans or concept plans for the Highway Commercial and Commercial 2 Zone and the zones around the rotary. Include specifications and regulations to minimize traffic impacts, address infrastructure needs and availability, and treat the Shunock River as an amenity.*
    - *Adopt clear and specific design guidelines and architectural standards to better inform future development and/or consider forming a Design Review Committee*

to advise the Planning and Zoning Commission.

- *Ensure that all new development will be of appropriate scale and design relative to its location. (III.A)*
    - *Develop design guidelines that are clear yet flexible to ensure good (suitable) design but allow for creative alternate designs. Design guidelines or architectural standards should clearly reflect the desired "look" for North Stonington (in keeping with its rural character).*
    - *Master Plan specific areas with the help of consultants or planning students to develop a clear concept or visions for the specific areas that include desired uses and design and considers all impacts to the natural resources.*
- *Invest in the necessary planning and land purchase, and enact appropriate regulations to ensure the preservation and protection of North Stonington's valuable natural resources and open space. (III.C.)*
    - *Establish an overall goal for the amount of open space to be permanently protected.*
    - *Identify existing and potential wildlife or green corridors on a map and encourage preservation and purchase of open space parcels within. Concentrate on connecting corridors by utilizing all types of open space and learn how they can work together to create these corridors.*
    - *Continue to prevent urban sprawl through effective zoning regulations and master planning.*
    - *Encourage and facilitate the private purchase of open space (by land trusts or other similar organizations).*
    - *Promote purchase/transfer of development rights and permanent conservation easements.*
    - *Continue to preserve farmlands and forests (under PA 490, 10 mil or permanently).*
    - *Continue to support fee-in-lieu of provision in subdivision regulations to create and maintain a funding source to be used to purchase desired parcels (consistent with the Plan of Conservation and Recreation Lands) and to facilitate acceptance of only meaningful set-aside areas (rather than random bits of open space).*
    - *Enforce wetlands regulations.*
    - *Actively support goals, objectives and actions identified by the Conservation Commission in the Plan of Conservation and Recreation Lands (PCRL).*
    - *Invest in necessary planning and infrastructure improvements, and enact appropriate regulations to ensure the preservation and protection of North Stonington's lakes and waterways.*

- *Engage in proactive planning to ensure that all future plans consider the need to preserve North Stonington's character, and clearly identify smart development choices. (III.D.)*
    - *Increase awareness about littering, pollution, and blight.*
    - *Enforce/maintain existing regulations concerning setbacks, buffers and lot size. Create a Future Land Use Map as well as a Future Conservation Plan Map and revise zoning regulations to support these plans.*
    - *Encourage creative adaptation and reuse of historic structures.*
    - *Encourage succession plans and the transfer of development rights to protect farms.*

- *Develop a farm and forest preservation plan.*

POCD Section 12 Future Land Use Plan presents North Stonington's vision for its future, displayed graphically on the Future Land Use Map. The study rivers' watersheds in North Stonington are designated for the most part as Conservation & Recreation, Rural Preservation (R80), Medium Density Residential (R60), and High Density Residential (R40). Most of the future R60 and R40 zones lie along an existing development corridor in the southern part of town, generally along I-95 and Route 2. Other land uses are shown in this corridor including industrial, commercial and conservation areas. Three "Planning Opportunity Areas" are shown in this corridor, one along Route 2, one at the intersection of Route 2 and the southern I-95 exit, and one at the northern I-95 exit. Additionally, the Future Land Use Map shows "Under Utilized Parcels" scattered around town; they represent a type of "Opportunity Area". The Under Utilized Parcels are presented in Section 12 as a type of site which might be appropriate for new commercial development, but other portions of the plan (Appendix C described below) indicate some of those along the Shunock and Green Fall Rivers are best suited for conservation.

Overall the Future Land Use Plan reflects existing development patterns, with some increase in development density, particularly in the southern part of town. The Shunock River lies just to the north and parallel to the historic development along Route 2; it will therefore be subject to more development than the Green Fall River. Even so, most of the Shunock River corridor and watershed will remain in an undeveloped or very low density development condition. The town's Level A Aquifer Protection Zone occurs along the Shunock aquifer just west of the Village of North Stonington (Milltown), affording an increased level of resource protection. Development near the Shunock at the village should not adversely affect the river because this area lies within the Village Preservation Overlay District. The principal area of concern with regard to future development near the Shunock River is the area generally from Route 184 to I-95 and finally to its confluence with the Pawcatuck River at the southernmost corner of Town. This area is shown in the future with various commercial land uses, some medium density residential uses, and vacant parcels within a Planned Opportunity Area; the area also has water and sewer service. With the I-95 interchange immediately nearby, this area could experience an intensification of commercial development.

The Pawcatuck River that forms a southern border of North Stonington could also be subject to development impacts near the Planned Opportunity Area at I-95 and Route 2. Development of Medium Density Residential (R60) along the Pawcatuck is not likely to impact the river ORVs because of the large lots and modest development density.

The Future Land Use Plan shows the entire segment of Green Fall River within either protected conservation land or the Rural Preservation (R80) zone. Assuming Under Utilized Parcels shown along the Green Fall River remain in a largely undeveloped condition, consistent with the Rural Preservation Zoning and the conservation plan described below, the Future Land Use Plan provides excellent protection of the river ORVs and the resources throughout the watershed.

<u>Plan of Conservation and Recreation Lands</u>

The Plan of Conservation and Recreation Lands (PCRL) was prepared by the Conservation Commission in 2013 and is incorporated by reference as Appendix C of the POCD. This plan provides a high level of detail regarding conservation and recreation resources and priorities for future

preservation, acquisition, and management. Much of this PCLR is relevant to the protection of the Shunock, Green Fall and Pawcatuck Rivers. The report's major findings include:

> *Areas of the town most prone to increased development and density are generally located where valuable surface and underground water resources occur as well as in areas of prime farmland. The need to protect these waters and rich farmland soils substantially heightens the need for sound planning and enforcement and renewed effort to increase awareness about the value of greenways and wildlife corridors.*

The PCRL's Focus Areas Map emphasizes "…the Green Falls River and Shunock River watersheds as the dominating features of the eastern and western sides of town respectively."

The PCRL highlights the importance of these two rivers:

> *The town of North Stonington has two major river basins, the Shunock River Corridor in the west section of town and the Green Falls River Corridor in the east. Each of these important rivers runs through parts of the largest aquifer in the state of Connecticut before joining the Pawcatuck River and emptying into Long Island Sound. The protection of these water sources and their tributaries is of paramount importance to the health of our town, our state and our regions coast line. The efforts of The Wood-Pawcatuck River Association to attain federal recognition as a Wild and Scenic River is well underway. Once designated, the Shun[o]ck and Green Falls Rivers as major tributaries will be included in that protection.*
>
> *A large portion of Pachaug Forest separates the two basins through the center of North Stonington. Town regulations specify a 100' buffer along all water courses. This regulation, combined with current conservation easements, open space parcels, and land protected by private conservation organizations establish the foundation for eastern and western greenway/wildlife corridors. Properties identified on the Desired Areas for Future Recreation or Preservation Map on page 17 will add to these corridors for wildlife and resource protection on into the future. Currently, approximately 8% of the total land in North Stonington is considered to be protected open space (i.e., conservation easements, owed by a land trust, development rights sold), with another 45% temporarily protected (including PA 490 farm and forest land and Pachaug State Forest). The goal is to increase the amount of protected open space especially within above mentioned eastern and western greenway/wildlife corridors, through public or private acquisition of available parcels or by encouraging conservation easements, restrictions, or sale of development rights.*

The PCRL provides great detail regarding river resources in Section 2.1 Western Resources and Shunock River Greenway Corridor, and Section 2.2 Eastern Resources and Green Falls River Greenway Corridor.

Section 3 of the PCRL, Future Conservation and Recreation Lands, "…identifies five broad goals for preserving and planning for the future conservation and recreation needs of the town. These goals aim to: maintain the rural character; protect the existing natural and historic resources; permanently protect water quality and quantity; provide appropriate areas for active and passive recreation; and improve regulatory procedures and prioritize land acquisition and uses."

Protecting the streams, wetlands, and headwater ponds and lakes that overlie and recharge aquifers is essential to safeguard the quantity and long-term quality of the town's drinking water. To protect the potential drinking water resources in the Shunock, Green Falls, Wyassup, and Pawcatuck Rivers, a 100 foot buffer must be maintained to restrict development within the area.

The Desired Areas for Future Recreation or Preservation Map highlights the primary greenway/wildlife corridors in town which include the Shunock River Corridor (Western Border Greenway/Wildlife Corridor) and the Green Falls River Corridor (Eastern Border Greenway/Wildlife Corridor).

Section 3.3 "identifies 26 parcels selected for future preservation within these three corridors should the opportunity arise. … and are identified on the Desired Areas for Future Recreation or Preservation Map." This map, and the table in Section 3.3 identifies site no.s 5 – 7 bordering Green Fall River, and site no.s 13 – 20 and 25 bordering the Shunock. Additional priorities for preservation are shown on the map, including CTDEEP Natural Diversity areas following all of the Pawcatuck River corridor, and most of the Shunock River corridor.

Section 3.4 Desired Future Recreation Land notes: "Passive recreation lands can be expanded through state, town, or land trust purchase of tracts rather than through the acquisition of conservation easements on private land that would be closed to the public. Ecologically sensitive areas and species can be best protected under trust management. These tracts can provide connective corridors and trails for enhancing town-wide conservation and recreational opportunities."

PCRL goals and objectives (section 4) include the following that are particularly relevant to rover protection:

- *Encourage expansion of the Village Protection Overlay Area and the North Stonington Village National Register of Historic Places district to include and buffer historic features associated with the village. (I.9)*
- *Seek funding to develop and implement a program for monitoring pollution to surface and underground waters, and for maintaining an adequate quantity of water needed to protect species' habitat, conservation areas, and recreation resources of the town. (II.2)*
- *Remap the aquifer protection area to better describe its actual boundaries and to include the Green Falls Aquifer. (II.3)*
- *Continue to avoid sewers in all residential zones, but consider sewers in commercial and industrial areas that are situated over the aquifer. (II.4)*
- *Designate the Shunock and Green Falls River and Valley, and the Wyassup Brook, corridor and their tributaries as areas of prime interest to the community as pure water resources and wildlife corridors. (III.4)*
- *Recognize the Green Falls River basin as an important resource from Voluntown to the Pawcatuck River for both the protection of pure water and as an important unspoiled wildlife corridor. (III.8)*
- *Recognize and maintain the 100-foot buffer zone to water resources (lakes, ponds,*

streams, and wetlands) along the Green Falls, Shunock and Wyassup water ways and their tributaries as identified in Inland Wetlands and Watercourses regulations. (III.9)

- *Support the current Federal Efforts to designate the Wood-Pawcatuck Rivers and their tributaries as wild river status. (III. 14)*
- *Continue to develop a network of trails and pathways that will provide the public with safe active and passive recreational opportunities, and provide connectivity to conservation and recreation lands. (IV.4)*
- *Focus resources and conservation efforts on parcels that have been specifically recommended (and identified on the Desired Areas for Future Recreation or Preservation Map)… (V.3)*
- *With respect to new subdivisions, continue to seek fee-in-lieu of open space rather than accepting isolated parcels of little use to the town that are costly to monitor and maintain. (V.7)*

Zoning

Both the zoning ordinance and zoning map for North Stonington are current as of November 2017. Both are stand-alone documents separate from the town code of ordinances; however, the town code essentially incorporates them by reference. The town code contains administrative regulations on roles and responsibilities of various town officials and commissions, and certain ordinances directly or indirectly related to zoning.

Within the study rivers' watersheds, the entire northern area of town is zoned Rural Preservation Zone (R80), with minimum residential lot sizes of 80,000 s.f.. The Pachaug State Forest is labeled but shown within this zone because the town's zoning does not separate government, conservation or preserved open space as a separate zoning category or district. Within this R80 zone there is a Seasonal Use Overlay Area forming a narrow band along the shore of Wyassup Lake.

All other zoning districts in the watershed are along or south of the Route 2 and Route 184 corridors. A large Economic Development District (200,000 s.f. minimum lot size) occurs in the area around the Route 2 – Route 184 intersection (rotary) and extending south to the Route 2 interchange with I-95; this zone includes the southern reach of the Shunock River in North Stonington. A large Industrial Zone (80,000 s.f. minimum lot size) is shown on the east side of this interchange, on both sides of I-95, and extending south to the Pawcatuck River. A Highway Commercial Zone (60,000 s.f. minimum lot size) is shown at the eastern border of town, south of Green Fall River, and on both sides of the I-95 interchange with Route 216. The Ashaway River flows through this zone, an area of existing highway related businesses.

Small areas of Commercial zoning (40,000 s.f. minimum lot size) occur in two locations along Route 2 south of the Shunock River corridor. Otherwise the zoning in the southern part of the watershed is Medium Density Residential (R60) with a 60,000 s.f. minimum lot size, and High Density Residential (R40) with a 40,000 s.f. minimum lot size. Despite their designations of High Density and Medium Density residential zones, many communities would consider the minimum lot sizes as representing a medium to low density of residential development. Two overlay areas occur along the Shunock River: the Level A Aquifer Protection Zone and Village Preservation Overlay Area, both described above in connection with the future land use plan.

The findings regarding North Stonington's existing zoning are essentially the same as described above in regard to the future land use plan:

- The Green Fall River and its watershed are well protected by the Rural Preservation Zone and the Pachaug State Forest
- The Ashaway River near I-95 is close to existing businesses within the Highway Commercial Zone
- The Shunock River upstream of Route 184 is well protected by the Rural Preservation Zone and Village Preservation Overlay Area where it flows through the village; south of Route 184 the Shunock flows through the Economic Development District associated with the I-95 and Route 2 interchange.
- The Pawcatuck River borders the Industrial Zone to the west and a Medium Density Residential (R60) zone to the east; lot sizes and environmental constraints suggest the river's ORVs will be protected.

Zoning ordinance section 307 Special Flood Hazard Area Requirements includes the additional requirements for Special Flood Hazard Areas (SHFAs) throughout town. This section of the zoning ordinance, in association with town code Division 3. - Provisions for Flood Hazard Reduction, set the requirements for development in floodplains and floodways and provides municipal compliance with the NFIP administered by FEMA. Although the zoning ordinance focuses on the FEMA mapped flood hazard areas, it includes additional areas known to flood and unprotected areas below established base flood elevations. Section 307 provides the permitting requirements for development in SFHAs.

The zoning ordinance offers additional resource protection with its minimum buildable area (MBA) requirements (section 402) which excludes wetlands, watercourses, floodplains and restrictive easements from buildable area required for residential lots. The MBA for R80, R60 and R40 zones are 40,000 s.f., 32,400 s.f. and 25,600 s.f. respectively.

Zoning ordinance section 505 Cluster Development for Open Space Preservation, allows the PZC to approve a cluster subdivision that meets certain requirements including preservation of at least one third of the site as open space. It includes provision for a visual buffer between the development and the open space, and the ordinance specifically references the creation of connected open space corridors and greenways.

Chapter 7 Overlay Areas describes the town's overlay areas including the Village Preservation Overlay Area in the Village of North Stonington, and the Water Supply Protection Overlay Area. The Village Preservation Overlay Area helps to protect the historic – cultural ORVs of the Shunock River where it flows through the village. This overlay area is "is intended to protect and preserve the appearance and character of the Village and its individual buildings, regardless of the type of land uses involved. The purpose of this Overlay Area is to recognize and preserve the unique historical character of the Village area."

> *703 WATER SUPPLY PROTECTION OVERLAY DISTRICT*
> *703.1 Purpose. It is the purpose and intent of the Water Supply Protection Overlay Area (WSPOA) to:*
>
> > *A. protect existing and potential public surface water supply watershed areas from sources of contamination;*
> > *B. protect areas of high groundwater availability from sources of contamination;*

C. promote public health and the general welfare of the community; and
D. promote environmental protection.

The WSPOA regulations include prohibitions of certain uses such as landfills, requires BMPs for certain land uses, provides performance standards regarding stormwater runoff and erosion and sedimentation control (among others) and includes requirements for environmental analysis of certain categories of proposed development. The WSPOA, however, is not shown or referenced on the town's zoning map. The zoning map does show the Level A Aquifer Protection Zone described above.

The town's Aquifer Protection Areas map (9/4/2013) shows both the Level A Aquifer Protection Area and an Aquifer Protection Zone. It appears the Aquifer Protection Zone generally encompasses areas mapped as aquifer by CTDEEP. The town's "Aquifer Protection Area Regulations" (2010) reference the protected area as CTDEEP mapped Level A and Level B areas. As of March 2018, only the one Level A Aquifer Protection Area has been delineated by CTDEEP, and this is the area that is shown on both the zoning map and the Aquifer Protection Areas map. The Level A Aquifer Protection Area is in the immediate area around the public water supply well next to the Shunock River west of the village. The Level B area is the larger area that contributes to recharge of that aquifer; this Level B area has not been delineated by CTDEEP at this time.

The status of the WSPOA boundary and its relationship, if any, to the larger Aquifer Protection Zone depicted on the Aquifer Protection Areas map is unknown.

Chapter 11 of the zoning ordinance provides design standards, including those related to sustainable development, landscape design, architectural character, historic landscape preservation, outdoor illumination, soil erosion and sediment control requirements, and stormwater management. This chapter contains most of the substantive requirements regarding stormwater management and erosion and sedimentation control. The substantive requirements related to flood hazard zones is in the zoning ordinance section 307 SFHA requirements and the town code Chapter 10, Floods.

The zoning ordinance provides procedural requirements for obtaining required permits or other approvals regarding land development, following the requirements of state enabling laws as applicable:

Chapter 12 Permits by Staff
1201 Zoning Permit
1202 Certificate of Zoning Compliance
1203 Change of Business/Commercial or Industrial Use of Buildings and Properties
1204 Property Line Adjustment/Lot Division ("Free Split")
1205 Soil Erosion and Sediment Control (SE&SC) Plan
1206 Land Disturbance Permit

Chapter 13 Permits by Commission
1301 Preliminary Concept Plan
1302 Site Plan Application
1303 Special Permit Application
1304 Text Amendment Application

1305 Zone Change Application
1306 Procedural Requirements

Land Development

"Subdivision Regulations, Town of North Stonington, Connecticut" effective 11/2/15, is a town ordinance provided as a separate document cross referenced by both the town code and zoning ordinance. They "…are intended to insure that land to be subdivided shall be of such character that it can be used for building purposes without danger to health or the public safety; and that proper provision be made for flood control, roads, drainage, utilities, open space, parks, playgrounds, erosion and sedimentation control, and measures that encourage the increased use of solar energy systems and other renewable forms of energy." The regulation applies to any subdivision of land into three or more parcels, except for those developments related to municipal, conservation or agriculture.

The regulations describe the process for subdivision review and approval, beginning with an optional sketch plan review, the formal application process, required referrals from the IWWC and Health Official, required notifications, and the public hearing process. Section 5 specifies plan requirements including site analysis plan, construction plan, soil erosion and sedimentation control plan and stormwater management plan. Section 6 presents subdivision design standards and Section 7 provides specifications for required improvements including those related to inspection and control. The regulations call for a minimum open space dedication of land amounting to 15% of the total area, or a payment in lieu of land dedication of equal value. If a land dedication is made, no more than 20% of the required amount may be wetland, 100-year floodplain or steep slopes.

Although the regulations include standard 6.9 Protection of Natural and Historic Features, the standard is very general: "Due regard shall be shown for all natural and historic features, such as large trees, watercourses, scenic points, historic spots, and similar community assets, which, if preserved, will add attractiveness and value to the subdivision." The plan requirements include a detailed inventory of site resources which should allow the Commission to make an informed decision regarding natural and historic resources.

Special Resource Protection

In addition to the aquifer protection and special flood hazard area protection described above, the principle relevant ordinance is the town's Inland Wetlands and Watercourses Regulations (3/22/12). These regulations regulate the standard 100-foot upland review area, and include the basic requirements in conformance with the state law. In recent years the town has required applicants for various permits to include electronic plan submissions or otherwise provide information allowing the town to accumulate and improve its natural resource database. In the case of the IWW regulations the town requires a list of all wetland boundary markers (flag) with their GPS coordinates, along with reference coordinates on site boundaries, facilitating wetland edge review and incorporation of approved boundaries on the official town wetlands map.

Recommendations

- Revise POCD and Future Land Use Map to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.
- River corridor preservation should be included in any planning along these rivers, especially in the areas south of route 184 and near I-95.
- Acquire or otherwise preserve “Under Utilized Parcels” shown along the Shunock River and the Green Fall River and prioritized for preservation in the PCRL.
- Show or provide reference to town Aquifer Protection Zone on Zoning Map.

5.2.2 Sterling

The Wood River headwaters are in the Pachaug State Forest in southern Sterling. All of the river corridor and most of the watershed is in dedicated open space, principally associated with the state forest. Additional large lots not shown as conservation are in agricultural preservation or public ownership (e.g. large lots south of Bailey Road and east of Porter Pond Road). Residential density is very low overall. Sterling has only one zoning district applicable to the watershed area; it allows residential and non-residential uses and controls development primarily through prohibitions, restrictions and standards. The extensive protection afforded by the Pachaug State Forest in combination with the town's low density requirements for land development should afford a very good level of river resource protection.

Plans

The Sterling 2009 Plan of Conservation and Development provides the following vision for the town:

> *the residents of Sterling appreciate the general nature and atmosphere that has existed in town that has helped to define the community. However, as internal and external forces pressure this unique balance between the historic development and new development, which, has had a visible impact on the town's historic landscape, the residents have become increasingly concerned about the future and direction of the community. This Plan of Conservation and Development identifies the critical issues that must be faced over the next ten years and beyond to address a vision for Sterling:*
>
> *Sterling will guide future growth and change to:*
> - *Protect its quintessential rural character,*
> - *Provide business opportunities in order to build a strong economic base, and ·*
> - *Provide infrastructure to enhance the quality of life for its residents.*
>
> *To achieve this vision, Sterling will pursue four* [sic] *guiding objectives:*
> - *Preserve the historic community character,*
> - *Establish efficient Town Villages in Oneco and Sterling Center*
> - *Explore developing a municipal campus at the former Sterling Central School*
> - *Guide residential growth through appropriate land use controls; and*
> - *Guide non-residential development in a* [manner] *that will encourage economic development.*

The Future Land Use Plan (map) shows no change in development for the southern portion of town where the Wood River and its watershed occurs. The Rural Growth Corridors and Rural Growth Centers depicted on the map all occur in the center of town in the historic villages of Oneco and Sterling along Plainfield Pike (Route 14A) and Sterling Road (Route 14).

> *The Future Land Use Plan … provides a graphic representation of the possible future land uses, structural, and other physical concepts discussed in this Plan. Sterling has developed over the past 200 hundred plus years without regulatory guidance. The Town has not created a regulatory environment utilized in most Connecticut Town's (ie. zoning). As Sterling faces may internal and external forces which shape the way that land is developed and utilized they may want to choose to investigate way to influence growth in the community.*

Important recommendations of the plan relative to the Wood River watershed include:

- Creation of a Conservation Commission
- Development of an Open Space Plan
- Strengthening regulations protecting wetlands and watercourses
- Evaluate and revise environmental and site development monitoring and inspection procedures
- Explore developing modern land use regulations related to buildable areas, subdivision density, and non-residential uses among others
- Develop design standards for non-residential uses

Zoning

Sterling's Zoning Regulations (1/29/18) specify one basic zoning district for the town, and one overlay district (Age Restricted Housing Overlay District or ARHOD):

> *The Town of Sterling shall have one primary zoning district and an overlay district, subject to the following provisions. Any use otherwise permissible under state and federal law shall be permissible within the district provided that the other requirements of these regulations are met, except as listed in Section 30 1.2. Different uses, including residential and nonresidential uses, may be combined on a single lot provided that such uses comply with the other requirements of these regulations. Certain uses shall require the submission and approval of a site plan.*

Nonresidential uses include commercial and industrial uses. In terms of prohibited uses, "No Camp Trailer or Camper or Mobile Home shall be occupied as a residential unit."

The minimum lot area for all uses is two acres, with a minimum buildable area of 30,000 square feet. Buildable area is defined as:

> *A contiguous area of a lot within which permitted buildings or other structures may be readily erected, used and maintained, and primary and reserved septic systems, domestic water, and personal open space and recreation areas may be readily supported, due to favorable soil, groundwater, and other natural characteristics.*

Section 4.2 of the regulations provides detail on natural resources considered unbuildable, including wetlands and floodplains.

A two unit dwelling (duplex unit) is allowed, but the minimum lot area is then four acres.

> *There shall be no restriction on the number of nonresidential buildings or uses that may be established on any lot, provided that all of the other applicable requirements of these Regulations are met.*

In additional to dimensional standards such as minimum setbacks, the ordinance specifies maximum lot coverage for buildings of 10% for residential and 40% for other uses. Maximum lot coverage by impervious surfaces is specified as 20% for residential and 60% for non-residential uses.

Use regulations include standards for septic system and well separation (75-feet), lighting, and excavations (see Appendix A discussion below).

All development requires a zoning permit, and where applicable an Inland Wetland and Watercourses permit. Site plans:

> *… shall be drawn to scale and shall show: (i) the total area of the lot and the area of each and every accessway, inland wetland and watercourse; (ii) the amount of street frontage; (iii) the locations of all existing and proposed buildings, structures, wells and subsurface sewage disposal systems; and (iv) the distances of all proposed wells and subsurface sewage disposal systems from all property boundaries.*

The PZC and may require site plan preparation by a professional land surveyor and/or a professional engineer.

Appendix A of the zoning regulations includes additional requirements regarding land excavation proposals, setting out the requirements for an Excavation Permit. This appendix to the zoning regulations incorporates the town code Excavation Ordinance also known as the Excavation Regulations (9/18/1999). The Excavation Permit application requirements and standards for review and approval are provided. Pursuant to section 6.03 Excavations, the regulations in Appendix A general apply to excavations of 500 cubic yards of material or more per year, and any land disturbance over one-half acre. Certain activities do not require an Excavation Permit if a Soil Erosion and Sediment Control Plan (SESCP) for the activity is submitted and approved by the Zoning Enforcement Officer. Projects requiring an Excavation Permit are also required to submit a SESCP for review and approval in accordance with Appendix A regulations. Inspection and enforcement are also included in these regulations. The town code (p. 15) also has an ordinance - Sand or Gravel Pits and Quarries (7/26/64) which allows such operations if they do not diminish surrounding land / property values, "… assure adequate surface gravity, drainage after such removal…" and further indicates the board of Selectmen may require a "Development Plan" be filed. Approval for such land use would presumably fall under the zoning regulations, including the provisions of Appendix A specifically.

Note the town ordinances still include "An Ordinance Establishing Minimum Land Use Regulations which went into effect in 2006"; it set a minimum buildable area of 50,000 square feet per lot, but this ordinance expired in 2011.

Land Development

Sterling's Subdivision Regulations (3/23/2010) include procedures for subdivision of land, and requirements related to site plans, soil erosion and sediment control plan, special flood hazard areas, open space dedication, design and construction standards, potable water and sanitary wastewater disposal.

The PZC is to render approval or disapproval of subdivision proposals in consideration of a number of factors including impacts to water supplies, flood hazard areas, and

> *Proper provision shall be made for the conservation of natural and cultural resources and*

the preservation of open space, stream belts, agricultural lands and recreation areas as identified in the Town Plan of Development and the Sterling Town Ordinances, as amended;

Proper provision shall be made to control soil erosion and sedimentation and to prevent the pollution of wetlands, watercourses, and water bodies; …

Note these subdivision regulations reference a minimum buildable area of 50,000 s.f., which appears to be superseded by the current zoning regulations which specify 30,000 square feet as the minimum buildable area.

Special Resource Protection

The Town of Sterling Ordinances and Regulations May 1796 through August 13, 2014 (revised 12/17/14) include a number that relate to excavation such as sand and gravel mining, flood hazard areas, sewage disposal and erosion control. It is important to review the entire code relative to specific resources or standards because these town ordinances are presented in chronological order, and include ordinances that have expired or been superseded as noted above.

Inland Wetland and Watercourses

The most relevant regulations for protection of the Wood River watershed are the town's Inland wetland and Watercourses Regulations (March 2012). The ordinance follows the requirements of the state act and regulates activities in wetlands, watercourses, and the standard 100-foot upland review area. The regulations include a 200-foot upland review area on either side of the Moosup River (outside the study area).

Sewage Disposal

The town code (p. 24) includes a Sewage Disposal Ordinance (8/18/1970) that requires approval for new septic systems by the Director of Health or their designated Town Sanitary Inspector in accordance with state health code requirements. Note that town ordinances related to sewers apply to an area outside the Wood-Pawcatuck Watershed.

Recommendations

- Revise POCD and Future Land Use Map to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.
- Evaluate potentially developable parcels in the Wood River watershed for potential impacts from allowed non-residential uses.
- Implement POCD recommendations to establish a Conservation Commission and to update land use regulations.

5.2.3 Stonington

The Pawcatuck River forms Stonington's eastern boundary with Westerly; the river centerline forming both the town boundary and state boundary for most of its length. The river corridor and watershed in Stonington is almost entirely within the Village of Pawcatuck (which includes Clarks Village south of the railroad). South of the village the river corridor and watershed narrows to Pawcatuck Point as the river enters Little Narragansett Bay. The southern half of the Pawcatuck River in Stonington is intertidal and lies within the Coastal Management Area. Shellfish beds underlie this southernmost reach of the Pawcatuck River. The Village of Pawcatuck is largely comprised of older commercial and residential properties on small lots, in keeping with the historic roots of this village as a nexus of road, rail, river and sea transportation. The historic center of downtown Pawcatuck is included on the National Register of Historic Places.

Commercial properties and zoning dominate the Route 2 corridor north of the Route 78 interchange, but the river corridor remains largely wooded there. The historic downtown area of Pawtucket contains relatively dense residential use with mixed commercial uses along the waterfront. Downstream of the West Broad Street (Route 1) river crossing the land uses are predominantly residential with lot size increasing southward towards Pawtucket Point. Residential docks and marinas occur throughout this southern reach. There appears to be little opportunity for new development along the river corridor south of Route 78. The town POCD, zoning, aquifer protection, wetland, flood hazard and development regulations all serve to protect and preserve the Pawcatuck River corridor and watershed in its present condition.

Plans

The "Town of Stonington 2015 Plan of Conservation & Development" (6/30/15) states three guiding principles: providing for sustainable development, strengthening existing villages, and promoting low impact commercial and residential approaches. A low projected population growth rate suggests a slow rate of growth and low development pressure. A community questionnaire conducted to help guide the plan in 2013 showed strong public support for open space and recreation:

Things people indicated they would like to see more of:

- *Bicycle and walking trails (89%)*
- *Open space and nature preserves (79%)*
- *Waterfront public access (78%)*
- *Park and recreation facilities (77%)*
- *Development with more open space (73%)*

Respondents also indicated their highest priority for the town was natural resource and open space preservation:

When asked to score 10 issues in terms of their importance in the Town of Stonington, respondents indicated the following (1 = lowest score, 10 = highest score):

- *Protection of natural resources and open space preservation (7.45)*
- *Enhancement the school system (6.70)*
- *Maintenance of local roads and utility infrastructure (6.48)*
- *Expansion of parks / recreational / walking paths / trails / sidewalks (6.30)*

- *Revitalization of existing village areas and filling current commercial vacancies (5.87)*
- *Protection of historic sites and buildings (5.75)*
- *Protection and enhancement of agriculture (5.15)*
- *Promotion of new commercial development (4.41)*
- *Expansion of public transportation opportunities (3.61)*
- *Promotion of affordable housing (3.31)*

The plan includes a major focus on coastal resources because most of Stonington's developed areas are along the coast and tidal rivers. As part of the town's approach to coastal management,

> *The Town of Stonington has three separate Harbor Management Commissions. The Pawcatuck, Stonington and Mystic Harbor Management Commissions are responsible for preparing and implementing plans which manage these public resources. There is not an active Pawcatuck Harbor Management Plan as draft plans have been rejected by voters several times.*

Section 3.1 Protect and Restore Coastal Resources states:

> *The identified wetlands, floodplains and adjoining uplands need to be protected through restrictions on new building with construction standards, setbacks and buffering so as to provide a margin from storm induced wave action, septic infiltration, increased flooding and more intense rain and wind events.*

The plan's recommendations for protection coastal resources sets as an initial goal the adoption of a Harbor Management Plan for the Pawcatuck River. Another relevant recommendation is "…to ensure that all Planning and Zoning development proposals shall address provisions for public access to the coast, its resources and recreational opportunities." Chapter 3 of the POCD includes many recommendations related to climate change and sea level rise.

POCD Chapter 4 Agriculture promotes the preservation of agriculture and shellfish beds, relevant in the southernmost reach of the Pawcatuck River.
Chapter 5 Natural Resources has a primary emphasis on the protection of water resources including surface waters, wetlands, and groundwater. Section 5.1 discusses water quality, noting the southern portions of the Pawtucket River that do not meet water quality criteria and where shellfish restrictions apply. The river and its watershed are shown as areas of high groundwater availability, and the northern portion of the watershed is shown within the town's Aquifer Protection Zone. The plan's recommendations regarding natural resource protection include a number that promote LID practices and various efforts to reduce non-point sources of pollution including stormwater management and public education. Additional recommendations in this chapter include:

- *Address the recommendations in CTDEEP's Pawcatuck River Watershed Bacteria TMDL Report. (5.1.15)*
- *Create a Watershed Plan to address stormwater management in the Town's various drainage basins. (5.1.16)*
- *Require vegetative buffers, swales and other appropriate drainage diversion and minimi-*

zation methods to wetland and watercourses to filter pollutants from stormwater runoff. (5.2.1)

Chapter 6 Open Space inventories different types of open space and notes the potential to develop agricultural parcels preserved under the state's PA-490 program (two sizeable parcels along the Pawcatuck corridor are shown as PA-490 parcels). Chapter 6 notes:

> *Subdivision Regulations have been revised to ensure that either open space is part of every residential development or a fee equal to 10% of the parcel value is collected for the purpose of open space acquisition elsewhere. A proposal to increase the open space set-aside from 15% to 20% of the development area was not endorsed by the Planning and Zoning Commission, but the Commission has been requiring easements over natural resource areas during development application approvals.*

Detailed recommendations regarding open space acquisition and land development regulations are provided, however most appear to have limited application in the Pawcatuck River corridor except to the extent it promotes acquisition of open space in important corridors / greenways, recommends a town (municipal) land trust, and recommends application for CTDEEP Greenway designation for selected and planned greenways. The POCD cites the 2007 Open Space Plan, and calls for its "maintenance". That 2007 Open Space Plan recommended the town "develop regulations that require open space considerations during redevelopment along rivers, streams, and watersheds."

Chapter 7 of the POCD, Scenic and Historic Resources, designates the entire Pawcatuck River shoreline south of Route 1 as a scenic area. The plan shows the Mechanic Street National Register Historic District, three National Register Sites and five historic mill sites along the river. The plan recommends a number of actions which might help to preserve the character of the historic shoreline of the Pawcatuck River including greater use of the Architectural Design Review Board and preserving public views to the water. The plan promotes "… adaptive re-use of the Town's mill buildings and other underutilized historic commercial buildings through regulatory incentives."

The POCD focuses on Villages in Chapter 8, promoting preservation of the historic character of Pawcatuck Village, encouraging economically viable mixed uses, and balancing the needs of updating stormwater management facilities with the historic resources. The plan calls for new, more detailed village plans and greater involvement of the Architectural Design Review Board.

Chapter 10 Commercial and Industrial Development identifies Pawcatuck village as a priority area for economic redevelopment:

> *The POCD questionnaire showed that there is overall desire, need and opportunity for economic development in Pawcatuck and is the priority area for economic development in Stonington. There are many opportunities for reuse and re-development including the Mechanic Street mills and properties near the intersection of Rt. 2 and Rt. 1. Pawcatuck has very little vacant land in the village and will require private investment in the existing downtown area properties.*
>
> *There are no major regulatory obstacles to development in the village of Pawcatuck with*

conducive zoning, parking and infrastructure.

The plan cites a number of downtown restoration / rehabilitation accomplishments but notes:

> *The main challenges in downtown Pawcatuck today include the lack of interest in investment in commercial properties for lease and deferred maintenance on key commercial buildings in the village.*

The Route 2 interchange with I-95 is an economic growth and development center located along the Pawcatuck River north of Bridge Street. The plan states:

> *The 2004 recommendation to create a new Highway Interchange Zone (HI-60) specifically at Exit 92 to encourage more economic development has been completed. After the change in zoning, new commercial buildings were completed in the Pawcatuck Farms commercial complex, including a new Stop & Shop supermarket, bank and fast-food restaurant. Also constructed over the past 10 years were a new La Quinta hotel and Tractor Supply retail store. Additional buildings are planned as part of the approved but un-built Liberty Crossing commercial complex. This development was approved in 2006 and included two large national retailers.*
>
> *Additional commercial development continues to be appropriate for the Exit 92 highway interchange area. There are a number of planned and permitted projects and pads that are shovel ready but lack funding due to the change in the economy. At the southern end of the Highway Interchange (HI-60) zone, the former Maple Breeze Park property was foreclosed and is available for development. Due to market conditions, the biggest challenge has been attracting new businesses to the area.*
>
> *There are no major zoning impediments to development in this area of Pawcatuck, but new development must continue to meet environmental and regulatory constraints to protect groundwater resources in this area. The Town needs to work with property owners to find a good balance between the business uses and the sensitive groundwater and other natural resources in this area, especially in the Alice Court area.*

Specific economic development recommendations relevant to the Pawcatuck River are to:

- *Encourage re-use of the mills and other underutilized commercial and industrial sites. (10.2.1)*
- *Encourage flexibility and creative adaptations regarding some flood hazard requirements in historic zones, specifically for historic structures. (10.2.2)*
- *Guide development to Exit 92 and Village of Pawcatuck. (10.2.4)*
- *Create a Heritage Mill District (HM) zone for historic mill sites. (10.2.10)*
- *Participate in the creation of a regional tourism master plan to identify current and potential visitor attractions/amenities/experiences. (10.4.3)*
- *Develop ways to make tourist attractions/ destinations more connected/integrated and more easily navigable via different forms of transportation, including bikes, sidewalks, public transportation, water taxi, etc. (10.4.4)*

Chapters 11 and 12 of the POCD describe municipal services and facilities and utilities, respec-

tively. For the Pawcatuck River, the most important facilities relate to water and sewer service. Public water service is provided throughout most of the watershed area by the Westerly Water Department. The Town of Stonington Water Pollution Control Authority (WPCA) manages the Sewer Service District covering the Pawcatuck River watershed from River Road north to the town boundary with North Stonington. Sewer service is available in all but the southernmost portion of the District. The Pawcatuck Water Pollution Control Facility is west of Hall Cove near the river. "The Pawcatuck WPCF was designed to treat an average wastewater flow of 1.3 MGD, and projected average flow for year 2025 is 0.94 MGD."

Transportation and Mobility (Chapter 13) of the plan includes a number of recommendations to improve pedestrian and bicycle access in the Pawcatuck River corridor. It also recommends creating "… a town-wide connected greenway trail plan." and improving pedestrian access to Westerly.

Chapter 14 Sustainability and Resiliency remarks on the importance of protecting coastal areas (particularly) from the effects of rising sea levels and flooding events:

- *Continue to review and improve hazard mitigation plans for recurring events, such as flooding as well as the threat of sea level rise. (14.6.1)*
- *Pursue accreditation of the Mechanic Street Flood Control Barrier. (14.6.3)*

POCD Chapter 15 Future Land Use presents Stonington's vision for the future with respect to land use. Within the Pawcatuck River corridor and watershed, the Future Land Use Map reflects existing land uses for the most part. The downtown village area and lands southward reflect current uses. Between the downtown village area and Route 78 the plan depicts the existing residential south of West Vine Street, and Managed Open Space to the north (West Vine Street School and St. Michaels New Cemetery). North of Route 78 the Future Land Use Map shows Highway Interchange land use. New development or redevelopment in this Highway Interchange area appears to have the most potential to affect land uses along the Pawcatuck River corridor in Stonington. The plan describes the Highway Interchange area intent to:

- *Focus on larger scale commercial development near highway interchanges*

and be

- *Sensitive to environmental resources, including groundwater resources, traffic impacts and community character*

<u>Zoning</u>

The Town of Stonington Zoning Regulations (2/1/18) are provided as a stand-alone document by the Planning Department. The town's Zoning Map Atlas (9/19/17) shows zoning districts in the Pawcatuck River corridor (from north to south):

- Commercial Highway Interchange HI-60 from the town line with North Stonington south to Route 78,
- Greenbelt Residential GBR 130 from Route 78 south to West Vine Street,
- Residential RH-10 from West Vine Street south to the Pawtucket Village District, with an Industrial Heritage Re-Use District at the old mill site,
- Pawtucket Village (PV-5) Commercial District in the historic downtown area,
- A Heritage Mill District between the River and Mechanic Street south of downtown, and

- Several residential districts including Residential Single Family RA15 in Clarks Village, Rural Residential RR80 and Residential Coastal RC-120 elsewhere along the riverfront, with three small areas zoned Commercial MC-80 along this coastal waterfront where existing marinas occur.

These zoning districts promote preservation of the existing Pawcatuck River corridor and watershed land uses for the most part. Continued development in the Highway Interchange Commercial District poses the greatest potential for land use change in the vicinity of the river corridor.

Section 4.9 Highway Interchange Zone (HI-60) of the zoning regulations provides the following description of this zone:

> *This zone encourages the development of high quality commercial office, retail, hotel, light industrial development, and age-restricted housing surrounding the interchanges of Interstate-95 with Routes 2, 49, and 78. It promotes land use which is compatible with the environmental conditions of the area, in particular, underlying aquifers and adjacent water bodies.*
>
> Further, section 4.9.4.7 requires:
>
> *Where development abuts the Pawcatuck River, a 100 foot noninfringement area shall be provided. Such non-infringement area shall remain undisturbed with the exception of any public trails, stormwater detention/retention ponds and/or wetland plantings required to renovate stormwater before entering the river.*

Section 4.11 Pawcatuck Village (PV-5) describes the zone:

> *This zone provides opportunities for village-scale, mixed use development in the Downtown Pawcatuck area that is sensitive to historic resources, minimizes impervious surfaces and maximizes green spaces and buffers to the extent feasible, in accordance with Section 6.4 when applicable. Public access to the Pawcatuck River is desired, especially as a Riverwalk*.

Article VII Special Regulations, establishes several overlay districts of importance to the Pawcatuck River corridor and watershed. Section 7.2 Groundwater Protection Overlay District (GPOD) is intended to:

> *protect and preserve groundwater quality within stratified drift aquifers which are existing or potential public drinking water supplies, to protect the public health, safety and welfare through the preservation of the Town's major groundwater resources to insure a future supply of safe and healthy drinking water for the Town of Stonington and its residents.*

The mapped GPOD includes all of the river corridor and most of the watershed north of the village, including all the HI-60 zone. The associated regulations prohibit a number of land uses know to contribute to groundwater contamination such as certain automotive – related uses (service stations) and others where chemicals are routinely handled or transported. The regula-

tion requires a Groundwater Protection Permit be issued by the PZC for any new development including subdivisions. Single family and duplex residences are generally exempt from this regulation. Performance and design standards are set in section 7.2.7, including those related to stormwater management.

Section 7.3 Coastal Area Management Overlay District (CAMOD or simply CAM area) includes the coastal flood zone identified by FEMA, all areas within 1,000-feet of the mean high water mark of coastal waters, and all areas within 1,000-feet of all tidal wetlands. The CAM area covers all of the Pawcatuck River corridor, and much of the watershed, south of Prospect Street. The CAMOD regulations provide additional requirements for development consistent with the state and federal requirements pursuant to the federal Coastal Zone Management Act.

Section 7.6 Erosion and Sedimentation Control Standards requires:

> *A soil erosion and sediment control plan shall be submitted with any application for development when the disturbed area of such development is cumulatively more than one-half (½) acre.*

This section sets plan requirements, including conformance with the state guidelines, and describes the process for plan certification (approval). Inspection and enforcement measures are specified.

Section 7.7 of the zoning regulations establishes the Flood Hazard Overlay District (FHOD). This section provides for town compliance with the NFIP. The FHOD provides limitations to new development in a number of locations along the river, in particular some of the HI-60 zoned land north of Route 78 and most of the shorefront from Clarks Village south.

Section 7.8 Residential Use Growth Management regulates development proposals of five residential units or more, in addition to other zoning and subdivision regulations (excluding elderly and low-income housing). It provides a limit on the number of residential building permits that can be issued in a given year.

The zoning regulations provide detailed standards for all districts, including standards related to renewable energy systems (7.22).

Article VII Administration and Enforcement sets the procedures for land development permitting including the process for subdivision review. Requirements for site plans, impact statements, public hearings and appeals are included in this Article.

<u>Land Development</u>

Stonington's subdivision regulations (Regulations Providing for Standards of Subdivision Development for The Town of Stonington, Connecticut, 8/8/16)

> *have been developed to be used in concert with the following land use regulations and documents, as amended:*
> *1. Town of Stonington Zoning Regulations. The Zoning Regulations, along with the Town's Zoning Map Atlas, regulate land uses and various bulk requirements in different zoning*

districts. The Zoning Regulations establish minimum lot sizes and other such requirements necessary for the design of a subdivision plan.
2. Town of Stonington Technical Standards of Land Development and Road Construction. This document provides many of the details and specific standards for road development, drainage design, utilities and other elements of subdivision design.
3. Town of Stonington Plan of Conservation and Development. This planning document provides goals and strategies for the long range development of the Town, including land use policies and recommended layouts of transportation networks.
4. Town of Stonington Open Space Plan. This planning document, which has been adopted as part of the Plan of Conservation and Development, provides goals and strategies for the preservation of open space, including recommended areas for conservation.

The regulations apply to subdivision of land into three lots or more, exclusive of those for agricultural, conservation or municipal purposes. The subdivision application process and standards are set out, including reference to required conformance to the Technical Standards for Land Development and Road Construction (3/21/11, authorized under separate ordinance effective 10/10/11). Requirements related to stormwater management, erosion and sedimentation control, water supply, sanitation, rare species/habitat and others related to natural and cultural resources are specified.

Subdivisions shall be designed according to the following principles:
5.1.1 To make best use of the natural terrain and preserve natural features including substantial trees, woods, rock outcroppings, views and vistas, wetlands and watercourses.
5.1.2 To preserve historic and archaeological features.

The subdivision regulations and associated technical standards are comprehensive and protective of natural resources, historic/cultural resources, and generally the ORVs associated with Stonington's shoreline along the Pawcatuck River. Very few parcels along the corridor appear available for new development that would change the character or resource values associated with the river corridor. This appears true of the watershed area as well, although new development in the watershed in the Highway Interchange zone is expected.

Additional resource protection is provided by the Architectural Design Review Board (ADRB) and associated "Town of Stonington Design Review Guidelines" (2009).

ADRB review is required for the following development proposals submitted to the Planning and Zoning Commission (ZR Section 2.15.3):

- *New commercial, institutional, industrial, multi-family residential or mixed-use construction for which Planning & Zoning Commission site plan or special use permit approval is required.*
- *Exterior changes to existing commercial, institutional, multi-family or mixed-use structures, defined as building additions, partial demolitions or replacement of materials comprising 25% or more of a structure's exterior façade.*
- *Special Detached Signs (ZR Section 7.12.7.4) and Multi- Tenant Signage Programs (ZR Section 7.12.8).*

ADRB provides advisory opinions to the PZC for the developments noted above; their guidelines identify two districts in the Pawcatuck River corridor: the Exit 92 Interchange Zone, and Down-

town Pawcatuck. The design guidelines provide general aesthetic visions for these two districts. The Downtown Pawcatuck vision is essentially one of preserving the village character including historic building facades and streetscapes. The vision for the Exit 92 District includes:

> *Building designs and landscape plans that take the rough edge off commercial strip development, and foster a style of architecture that is both sensitive to and suggestive of Stonington's historic villages.*

Special Resource Protection

Stonington's zoning and land development ordinances mentioned above include resource protection related to floodplains, aquifers, water supply, stormwater, erosion and sedimentation control, wetlands and wastewater disposal. In addition, the town has related regulations specifically oriented towards aquifer protection, inland wetlands and watercourses, and septic systems.

Aquifer Protection

Stonington's Aquifer Protection Area Regulations (5/12/05) are administered by the PZC as the designated Aquifer Protection Agency. The regulations specify delineation of aquifer protection areas, prohibited activities, permit application requirements, and standards for approval. The regulations require new development use best management practices for groundwater protection. As noted previously these regulations are particularly relevant to new development in the HI-60 zone north of Route 78.

Inland Wetlands & Watercourses

Stonington's Inland Wetland and Watercourse Regulations (10/5/2006) establish the Inland Wetlands and Watercourses Commission (IWWC) to administer and enforce the regulations which follow the state law's requirements. These regulations regulate the standard 100-foot upland review area but the IWWC may also regulate other activities outside the standard regulated areas if it determines the activity is likely to impact / affect wetlands or watercourses. In addition to standard permit procedures and review criteria, section 10.7 Conservation Easements and Non-encroachment Lines defines buffer areas to provide various conservation functions such as habitat protection, surface water and/or groundwater protection, recreation, education, erosion prevention and flood protection. "An applicant may propose a conservation easement and/or nonencroachment lines as a "management practice" to accomplish the purposes above described. In all cases where the applicant proposes nonencroachment lines or conservation easements, limits of a buffer or setback shall be determined on an individual basis." The regulations list a number of factors to consider in determining such setbacks or buffers.

Flood and Erosion Control Board

The town ordinance establishing the Stonington Flood and Erosion Control Board provides the regulations required for the town to comply with state and federal regulations for management of municipal stormwater systems.

Pawcatuck River Harbor Management

Pawcatuck River Harbor Management Commission was established by local ordinance to "…develop, adopt and implement a harbor management plan for the Connecticut side of the Pawcatuck River Harbor." The jurisdictional area is the Pawcatuck River extending from Route 1 south

to buoy 19 and across to Pawcatuck Point, and landward to the mean high water mark. As noted previously, a harbor management plan has not been adopted at this time.

Septic Systems

The town is part of the Ledge Light Health District. Ledge Light provides permitting review and approval for onsite septic systems in accordance with state law. Most of the Pawcatuck River corridor and watershed is within the existing sewer service area, but individual septic systems are used outside the service area, generally south of Clarks Village.

Recommendations

- Revise POCD and Future Land Use Map to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.

5.2.4 Voluntown

A segment of Wood River is located in northeastern Voluntown and the headwater segment of Green Fall River is in southeastern Voluntown. Both rivers' watershed areas in Voluntown are almost entirely comprised of dedicated open space (Pachaug State Forest); the remainder is mostly undeveloped, low density residential and agricultural use. Dedicated open space, low density residential zoning and town regulations afford an excellent level of protection for the rivers and their ORVs.

Plans

Voluntown's Plan of Conservation & Development (2010) stated goals include:

- *Retain Voluntown's rural character throughout as much of the town as possible.*
- *Protect the natural resources of Voluntown, particularly the quality of surface and ground waters.*
- *Maintain a safe, attractive, and socially sound living environment for present and future residents of all ages.*

While Voluntown's POCD references a minimum lot size of 120,000 s.f. throughout the Rural District, it also indicates "This requirement could be reduced in various areas of town." (POCD 2010, p. 29). The current zoning in fact specifies 80,000 s.f. as the minimum lot size in the Rural District (see below). Voluntown's Future Land Use map indicates all of the lands within the study rivers' watersheds should remain in state forest.

Zoning

Voluntown's zoning regulations are cited as section 4 of the town code, but are provided as a separate document (Zoning Regulations, March 2012). Section 2 of these zoning regulations provides definitions for key terms, including:

> *2.5 Buildable Area: Land area on a parcel exclusive of: wetland and watercourses; areas within the 1 00-year flood boundary; slopes in excess of 25%; rock or ledge outcrops; rights of ways or easements, and, utility and drainage easements.*
>
> *2.16 Excavation. (1 / 1/90) The excavation, grading, depositing (7 /1/98), or removal of earth material, including, but not limited to, topsoil, sand, gravel, clay or stone, which involves more than 100 cubic yards of material in a single calendar year, except in connection with (a) a bonafide construction project for which a zoning permit has been issued; (b) a subdivision approved by the Commission; or (c) farming conducted on the same property or adjacent property, provided no such material is sold to another and no more than 400 cubic yards of material is removed in any one (1) calendar year.*

All of the land within the subject river watersheds is shown as Rural District, State Forest, or Water on the zoning map. The Rural District is defined in section 4.1.2:

> *Rural District: Most of the Town is included in this district, which is intended to preserve as much of the Town as possible in a low density settlement pattern. This is intended both to retain the rural character of the Town and to minimize the need for extending*

public facilities and services throughout the entire Town.

Section 6.1 defines the allowed uses in the Rural District: single family and two-family residences, agriculture, forestry, religious and government institutions, public utilities, home businesses, kennels, horse riding/training/boarding, family home day care, and cemeteries.

Section 6.2 lists uses requiring a special exception pursuant to section 9. These uses include automotive facilities, hotels, campgrounds, sand and gravel extraction/processing, and telecommunications towers.

Section 6.3 specifies a minimum lot size of 80,000 s.f. per residential unit or other use, with a minimum of 30,000 s.f. of developable land (140,000 s.f. for a two family dwelling with at least 50,000 s.f. of developable land). Requirements for the building / septic system envelop within the developable land area are also specified.

Section 8.3 lists prohibited uses including junkyards and refuse disposal areas (except the town's designated facility).

Section 8.4, Uses near water specifies a minimum setback of 25-feet for buildings and 75-feet for septic systems from the edge of any watercourse, waterbody or wetland as measured from the edge of high water (flood).

Section 8.5 requires development in Special Flood Hazard Areas to meet the requirements of the town's Flood Damage Prevention Ordinance.

Section 8.8 specifies the requirements for approval of "Wind Energy Conversion Systems", including those related to lot size, height, setbacks and noise.

Land Development

Voluntown's subdivision regulations are cited as section 5 of the town code but are provided as a separate document (Subdivision Regulations, Town of Voluntown, July 2011). These basic regulations govern lot subdivisions into three or more lots. A pre-application sketch plan is recommended, but not required. An E&S control plan is required, and various reports regarding proposed infrastructure. Compliance with other town ordinances (e.g., wetlands, flood zones) is required. Basic design standards are set forth, including a minimum 50-foot subdivision road right-of-way.

Section 7 includes requirements for reservation of open space to be conveyed to the town or subdivision homeowner's association:

The total amount of area to be reserved for open space, parks and playgrounds shall not be less than one (1) acre per twenty (20) lots or a minimum of ten percent (10%) of the gross site, except by mutual agreement between the applicant and the Commission.

The town may require the developer to satisfy this requirement in whole or in part through an in lieu fee payment.

Very little land area in the subject watersheds appears available for further subdivision.

Special Resource Protection

Voluntown's Code of Ordinances incorporates the Zoning Regulations (described above) as section 4, and the town's inland wetlands & watercourses regulations (described below) as section 3. The additional special resource protection ordinances described below relates to flood damage prevention. Note that the current town code, updated in 2014, includes ordinances such as the flood damage prevention ordinance enacted in 1998 (p. 31-37) that was subsequently replaced in its entirety by the current flood damage prevention ordinance enacted in 2011 (p. 66-75). It is therefore important to search for the revisions, amendments, repeals or other changes in the code. The zoning, subdivision and wetland regulations that are part of the town code are provided as separate documents, and appear to represent the current regulations. The town regulations governing the establishment, makeup and function of the town boards and commissions that oversee the zoning, subdivision and wetland regulations appears in the town code, and some have changed over time.

Inland Wetlands and Watercourses

The town's Regulations for The Protection and Preservation of Inland Wetlands and Watercourses are section 3 of the town code of ordinances but are provided as a separate document current as of June 1, 2012. These regulations regulate the standard 100-foot upland review area but the town may increase this upland review area if slopes >15% are adjacent to any area. The regulations indicate the IWWC may also regulate other activities outside the standard regulated areas if it determines the activity is likely to impact / affect wetlands or watercourses.

Flood Damage Prevention Ordinance

The current Flood Damage Prevention Ordinance (Code p. 66 - 75) was enacted in 2011 and it supersedes the older ordinance of the same name (Code p. 31 – 37). This ordinance regulates development in FEMA designated flood hazard areas in compliance with federal and state requirements for participation in the NFIP.

Recommendations

- Revise POCD and Future Land Use Map to show areas proposed for Wild and Scenic River designation.
- Incorporate scenic river guidelines / standards into development regulations.
- Update the town code to eliminate superseded ordinances

REFERENCES

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Table 1. Summary of Plans and Ordinances, Wood-Pawcatuck Wild and Scenic Rivers Study

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

Town	Rivers[1]	Comprehensive Plans (RI) and Plan of Conservation and Development (CT)					
		Plan Date & Status[2]		Future Land Use Plan / Map	Protection of River Values[3]		Comments
		Adopted Plan	Draft Plan	Corridors	Watersheds		
Charlestown	P	2006 E	expected 2018	Yes	Yes		2 historic villages
Exeter	B, QU, W	2011 E		Yes	Yes		village approach
Hopkinton	A, P, W	2/5/2018		Yes	Yes		WPWSR support
North Kingstown	Only C (QU) watersheds	8/20/2008 E	July 2016	Not Applicable	Yes		
Richmond	B, P, QU, W	9/20/16 E		Yes	Yes		WPWSR support
South Kingstown	C, P, QU	1/11/16 E		Yes	Yes		
West Greenwich	QU, W	2008		Yes	Yes		plan not accepted by state
Westerly	P	11/7/2011 E	expected 2018	Yes	Yes		
North Stonington	GF, P, S	2/12/2013		Yes	Yes		WPWSR support, OS Plan 2013
Sterling	W	June 2009		Yes	Yes		
Stonington	P	5/7/2015		Yes	Yes		OS Plan 2007
Voluntown	GF, W	2010		Yes	Yes		

Notes:
1. A = Ashaway, B = Beaver, C = Chipuxet, GF = Green Fall, P = Pawcatuck
QU = Queen / Usquepaugh, W = Wood, watershed = C and QU watershed only
2. Date of Town adoption; E = expired
3. Wild & Scenic River values are free-flowing condition, water quality and
Outstandingly Remarkable Values (ORVs) identified in the study watershed

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

			Zoning Ordinance			
			Zoning Districts[4]			
Town	Source	Date	Corridors	Watersheds	Cluster	Comments
Charlestown	Code Ch. 218	1/8/2018	OS, LDR, VO, GWO	OS, LDR, VO, GWO	Yes	VO w/ MDR, C, I
Exeter	Code Ap. A	10/2/2017	OS, LDR , GWO	OS, LDR, GWO, C, MU	Yes	C, MU along Rt. 2 south
Hopkinton	Code Ap. A	12/21/2007	LDR, C, M, GWO	LDR, C, M, GWO	Yes	Also Code Ch 13.5
North Kingstown	Code Ch. 21	7/17/2017	Not Applicable	LDR, C, I, GWO	Yes	
Richmond	Code Ch. 18	1/2/2018	LDR, C, I, GWO	LDR, C, I, GWO, PD	Yes	
South Kingstown	Code Ap. A	2/12/2018	OS, LDR, GRW	OS, LDR, I, C, GWO	Yes	
West Greenwich	Ord. 16[5]	5/10/2017	OS, LDR, I	OS, LDR, MDR, HDR, I C, MU, GWO, HMO	Yes	Wood - OS & LDR, Queen - OS, LDR, I
Westerly	Code Ch. 260	2/26/2018	OS, LDR, MDR, HDR, I C, MU, GWO, HMO	OS, LDR, MDR, HDR, I C, MU	Yes	River Corridor Overlay is reserved
North Stonington	Indep. Doc.[5]	11/17/2017	LDR, VO, C, I, GWO	LDR, VO, C, I, GWO	Yes	
Sterling	Indep. Doc.[5]	1/29/2018	LDR, MU see comments	LDR, MU see comments	Not Explicitly	one primary zone allows various uses if they meet standards and are not prohibited
Stonington	Indep. Doc.[5]	2/1/2018	LDR, MDR, HDR, C, I, MU, GWO, CAMO	LDR, MDR, HDR, C, I, MU, GWO, CAMO	Yes	Pawtucket Village, Industrial Heritage Re-Use and Heritage Mill Districts along river. Also sep. Aquifer Protection Reg.s
Voluntown	Code Sec. 4[5]	3/1/2012	OS, LDR	OS, LDR	Not Explicitly	

Notes: 4. Zoning districts generalized to facilitate comparison, see town discssion and Appendix A maps and ordinances for town specific zones. Does not include overlay districts for flood hazards or wetlands.
District codes: C = Commercial; GWO = groundwater / aquifer protection overlay; HMO = Hist. Mill overlay I = Industrial
LDR / MDR / HDR = Low, Medium, High Density Residential (2+ acre, 1 ac. +/-, and 0.5 ac. or smaller lots, respectively;
M = Manufacturing, MU = Mixed Use; OS = Open Space; PD = Planned Development; VO = Village Overlay

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

			Land Development Regulations		
			Protection of River Values[2]		
Town	Source	Date	Corridors	Watersheds	Comments
Charlestown	Code Ch. 188	1/8/2018	Yes	Yes	requires cluster residetial
Exeter	Code Ap. B	10/2/2017	Yes	Yes	TDRs
Hopkinton	Code Ch. 18[5]	9/3/2014	Yes	Yes	Also Stormwater and Hazard Mit. Plans
North Kingstown	Code Ap. A	7/17/2017	Not Applicable	Yes	Little opportunity for new development in watershed
Richmond	Code	10/27/2015	Yes	Yes	
South Kingstown	Indep. Doc.[5]	12/12/2012	Yes	Yes	
West Greenwich	Ord. 4[5]	5/18/2015	Yes	Yes	
Westerly	Code Ch. A261	2/26/2018	Yes	Yes	
North Stonington	Indep. Doc.[5]	11/2/2015	Yes	Yes	
Sterling	Indep. Doc.[5]	3/23/2010	Yes	Yes	
Stonington	Indep. Doc.[5]	8/8/2016	Yes	Yes	Also sep. Design Review Guidelines 8/09, Technical Standards 3/21/11
Voluntown	Code Sec. 3[5]	7/1/2011	Yes	Yes	

Notes: 5. Published as a separate document from town code.

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

Special Resource Protection (continued on nex page)

Town	Study Rivers	Wetlands & Watercourses	Floodplains	Stormwater	Groundwater	Septic Systems & Sewers	Soil Erosion & Sediment Contol
Charlestown		Ch. 174, 188, 210, 218	FHO, Ch. 117	Ch. 188	GWO	S. 11	Ch. 174, Ch 188
Exeter		App. A Sec. 2.5.2, (	Ch. 22 Art. IV	App. A Sec. 2.5.2	GWO	App. A Sec. 2.5.2	Ch. 23
Hopkinton		Ap. A Sec. 33	FHO, Ap. A Sec. 33	Ch. 13.5, SWMPP	GWO	WWMD Ch. 21	Ch. 13.5
North Kingstown		Ch. 8 Art. IX	FHO, Sec. 21-188	Ch.8 Art. IX	GWO, Ch. 8 Art. VII, S. 21-186	Ch. 8 Art. III, VIII	Ch. 8 Art. IX Div II
Richmond		LDSR	FHO, Ch. 18.44	Ch. 8.06	GWO, Ch. 18.7	LDSR	Ch. 15.06
South Kingstown		Ch. 20, 21, LDSR	FHO, Ap. A Sec. 601, Ch. 21	Ch. 20	GWO, Ap. A Sec. 602	WWMD, Ch. 19 Art. 2	Ch. 20 Art. 2
West Greenwich		Ord. 1a, 4, 16 Art. VII Sec. 10, Art. IX	Ord. 4, 91	Ord. 4, 90	Ord. 4, 16, 84	Ord. 4, 7	Ord. 4, 79
Westerly	Sec. 260-57, (260-15E & -56 res)	Ch. 86, 223, 260, A261	FHO, Ch. 127, 260, A261	Ch. 223, 224. 260, A261	GWO Sec. 260-52, Ch. 251	Ch. 206, 260, A261	Ch. 224, 260-89, A261
North Stonington		IWWC reg.s, LDSR	FHO, Ch. 10, Zoning 307, LDSR	Ch. 10, Zoning 1112, LDSR	GWO APA Reg.s, Zoning 703	Ch. 9 Art. II	Ch. 10, Zoning 1111, LDSR
Sterling		IWWC reg.s, Zoning Ap. A, C, LDSR	Code p. 47, 78, 97, LDSR Sec. 7	Code p. 124, Zoning Ap. A, C, LDSR S. 10	Code p. 124, LDSR S. 11	Code p. 24, LDSR S. 11	Code p. 97, 124, Zoning, 6.03, Ap. A, LDSR Sec. 6
Stonington	P.R. Harbor Manag. Com., Zoning 4.9.4.7	IWWC reg.s, Zoning 7.3, LDSR	FHO, Zoning 7.7, LDSR 7.5	Ord. Illicit Disch. ...,Zoning 7.13, LDSR 5.7, 5.9, 7.4	GWO, Zoning 7.2, Aquifer Prot. Regs	Zoning 6.6, 7.2, 7.8, 8	Zoning 7.6, LDSR 5.8, 7.6
Voluntown		IWWC reg.s, Zoning 8.4, LDSR	Code p. 66, Zoning 8.5, LDSR 5.4	Road Ord. p. 47, LDSR 4.3, 5.4.3	Zoning 9.5.1, LDSR 3.1.2 (wells)	Zoning 3.2.2, 9.5.1, LDSR 4.3	Zoning 10.4.1, LDSR 4.4

Notes:

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

Special Resource Protection (cont.)

Town	Resource Extraction	Solid Waste	Vegetation	Special Habitats	Open Space / Conservation	Historic / Cultural Resources
Charlestown	Ch. 174, 218	Ch. 165, 218	Ch. 163, 188	Ch. 188, 218	Ch. 11, 163, 184, 218	VO, Ch. 188, 218
Exeter	Ch. 30 Art. I, II	Ch. 34	App. A Sec. 2.5.2	App. A Sec. 2.5.2	App. B Sect. 5	App. A Sec. 2.5.2
Hopkinton	Ap. A, Ch. 17, Earth Rem. Ord.	Ch. 16	Ch. 13.5	Ch. 13.5	LT, Ch. 19.7, LDSR	Ch. 7, 13.5
North Kingstown	Ch. 16	Ch. 6	Ch. 8 Art. IX, Ch. 17 Art. IV, Ap. A	App. A 16.6.3	Ch. 21 Art. VII, Sec. 21-218	Ch. 21 Art. XIII, Sec. 12-5
Richmond	Ch 15.16	Ch. 8.18	Ch. 18, LDSR	LDSR 13.2.3.1	Ch. 18.38, 18.41, LDSR Art. 4	Ch. 18, LDSR
South Kingstown	Ap. A	Ch. 15	Ch. 18.5, LDSR	Ap. A Sec. 510	LDSR Art. III, V	Ch. 14 Art. 2, HOD, Ap. A Sec 600
West Greenwich	Ord. 16	Ord. 1a, 2, 7, 28, 44, 60, 74	Ord. 4, 16 Art. VII, IX	Ord. 4, 16 Art. IX	Ord. 4, 16 Art. VII, LT, Ord. 67	Ord. 4, 16 Art. VII, IX
Westerly	A261, Temp Measure 4/3/17	Ch. 217	CH. 128, 260, A261	Sec. 260-84, A261-30	LT, Ch. 30, 260-13, 260 Art. IX	Ch. 137, 260 (-55 res), 260-57, A261
North Stonington	Zoning 202, 1006	Ch. 17	Zoning CH. 10 & 11, LDSR	Zoning 1009.4, 13 J, LDSR 6.6	Ch. 16-7, Zoning 505, LDSR	Zoning 702, 1109, LDSR
Sterling	Code p. 15, 124, Zoning Ap. A	Code p. 30, 75, 106, Zoning 116.14	Code p. 124, Zoning Ap. A, C, LDSR 2.6	Zoning Ap. C	Zoning Ap. C, LDSR Sec. 8	Zoning Ap. B, C, LDSR S. 5
Stonington	Zoning 7.5	Ord. Solid Waste	Zoning 2.16	Zoning 2.16, 8.8, LDSR 7.9	Zoning 6.6.22, LDSR Ch. 8, 10	Zoning 6.6.24, 8.8, LDSR 7.8
Voluntown	Zoning 9.5.7	Recycling Ord. p. 21, 27, Zoning 8.3	LDSR 4.3, 8.1.2	LDSR 8.1.2	LDSR 7.1, 7.3	Zoning 10.2, LDSR 4.3

Notes:

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

Code of Ordinances

Town	Date	Source Online or Other	Comments
Charlestown	1/8/2018	https://ecode360.com/CH1115	
Exeter	10/2/2017	https://library.municode.com/ri/exeter/codes/code_of_ordinances	
Hopkinton	12/21/2007	https://library.municode.com/ri/hopkinton/codes/code_of_ordinances	
North Kingstown	7/17/2017	https://library.municode.com/ri/north_kingstown/codes/code_of_ordinances	
Richmond	3/6/2018	http://clerkshq.com/default.ashx?clientsite=richmond-ri	
South Kingstown	2/12/2018	https://library.municode.com/ri/south_kingstown/codes/code_of_ordinances	
West Greenwich	undated 2016-2018	https://www.wgtownri.org/town-clerk/pages/ordinances	Each Ord. sep. dated doc.
Westerly	2/26/2018	https://ecode360.com/WE1997	
North Stonington	9/18/2017	https://library.municode.com/ct/north_stonington/codes/code_of_ordinances	
Sterling	8/13/2014	http://www.sterlingct.us/wp-content/uploads/2015/05/Ordinance-Rev-December-17-2014.pdf	
Stonington	undated on town website	http://www.stonington-ct.gov/special-acts-and-local-ordinances	
Voluntown	2014	NA online	

Notes:

Table 1. Summary of Plans and Ordinances
Wood - Pawcatuck Wild and Scenic Rivers Study

References and Contacts

Town	website	Town Clerk	Town Planner / Planning Department
Charlestown	http://www.charlestownri.org/	(401) 364-1200	(401) 364-1225
Exeter	https://www.town.exeter.ri.us/	(401) 294-3891	(401) 294-2592
Hopkinton	http://www.hopkintonri.org/	(401) 377-7777	(401) 377-7770
North Kingstown	http://www.northkingstown.org/	(401) 268-1551	(401) 268-1572
Richmond	http://www.richmondri.com/	(401) 539-9000 x 9	(401) 539-9000 x 6
South Kingstown	http://www.southkingstownri.com/	(401) 789-9331 x1236	(401) 789-9331 x 1241
West Greenwich	https://www.wgtownri.org/	(401) 392-3800	(401) 392-3800 x 121
Westerly	https://westerlyri.gov/	(401) 348-2508	(401) 348-2562
North Stonington	https://www.northstoningtonct.gov/	(860) 535-2877 x 21	(860) 535-2877 x 26
Sterling	http://www.sterlingct.us/	(860) 564-2657	(860) 564-2275
Stonington	http://www.stonington-ct.gov/	(860) 535-5060	(860) 535-5095
Voluntown	http://www.voluntown.gov/	(860) 376-4089	(860) 376-3867

Notes:

Appendix B:

Resolutions and Letters of Support

Resolutions and Letters of Support from Watershed Towns and State Agencies

Amy Rose Weinreich
Town Clerk
Clerk to the Town Council
Clerk of the Probate Court
Clerk to the Board of Canvassers

TOWN OF CHARLESTOWN

4540 So. County Trail
Charlestown,
Rhode Island 02813

Tel (401) 364-1200
Fax (401) 364-1238

Hearing/Speech Impaired,
Dial 711-364-1240

June 12, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Rd
Hope Valley, RI 02832

Dear Mr. Henry:

At their June 11, 2018 meeting, the Charlestown Town Council unanimously approved the enclosed Resolution in support of the commendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed – Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaug, Shunock, and Wood Rivers – as a Partnership Wild and Scenic Rivers through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands.

In addition, the Council unanimously endorsed the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee.

On behalf of the Council, thank you for your time and dedication in pursuit of this designation.

Sincerely,

Amy Rose Weinreich, CMC

Amy Rose Weinreich, CMC
Town Clerk

Enclosure

cc: Denise J. Poyer, Study Coordinator

TOWN OF EXETER, RI

Lynn M. Hawkins, CMC
Town Clerk
Council Clerk
Probate Clerk

675 Ten Rod Road
Exeter, R.I. 02822
Ph: (401) 294-3891
Fax: (401) 295-1248
clerk@town.exeter.ri.us

June 12, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and
Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

At its Regular Meeting held on June 4, 2018, in the Metcalf School Cafeteria, 30 Nooseneck Hill Road, Exeter, Rhode Island, the Town of Exeter Town Council voted unanimously to endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and the recommendation to seek Wild and Scenic Rivers designation through an act of the United States Congress.

The pertinent minutes from the June 4 meeting will be available on the Town of Exeter's website after the Town Council's July 9, 2018, Regular Meeting.

The Town Council and I wish you the very best in your endeavors. Should you need additional assistance, please do not hesitate to contact me.

Sincerely,

Lynn M. Hawkins

Lynn M. Hawkins, CMC

LMH:lmh
Copies to Exeter Town Council
Denise J. Poyer, Coordinator, Wood-Pawcatuck Study Comm

Town of Hopkinton

HOPKINTON, RHODE ISLAND 02833

INCORPORATED 1757

TOWN OF HOPKINTON, RI

RESOLUTION OF SUPPORT FOR

WILD AND SCENIC RIVERS DESIGNATION OF THE SEVEN RIVERS

IN THE WOOD-PAWCATUCK WATERSHED AND

ENDORSEMENT OF THE STEWARDSHIP PLAN

BE IT RESOLVED, that the Town of Hopkinton hereby supports the recommendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed – Beaver, Chipuxet, Green Fall, Pawcatuck, Queen, Shunock, and Wood Rivers – as Wild and Scenic Rivers through an act of the United States Congress;

And,

BE IT FURTHER RESOLVED; that the Hopkinton Town Council endorses the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee.

Adopted: June 4, 2018

ATTEST: Elizabeth J. Cook-Martin
Town Clerk

Town of North Kingstown

Rhode Island

No. 32

July 16, 2018

At the Regular Meeting of the Town Council of the Town of North Kingstown held on

July 16, 2018, a resolution was passed as follows:

WHEREAS, the Wood-Pawcatuck Wild and Scenic Rivers Study Committee was established in 2015 to develop a locally-based Stewardship Plan that describes the eligibility and suitability of a Partnership Wild and Scenic River designation for the Seven Rivers of the Wood-Pawcatuck Watershed and how they will be protected; and WHEREAS, the headwaters of the Chipuxet River and a portion of the Queens River sub-basin are located in North Kingstown; and

WHEREAS, the Town's groundwater recharge area overlays portions of these areas; and

WHEREAS, the benefits of the Wild and Scenic Designation include the preservation of a clean and plentiful water supply, protection of the rural character, protection of public health through promotion of the natural functions of the river and floodplains for flood control and outreach and educational opportunities that enhance the understanding of the watershed.

NOW, THEREFORE, BE IT RESOLVED: That the Town of North Kingstown hereby supports the recommendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed - Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers - as a Partnership Wild and Scenic Rivers through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands; and be it

FURTHER RESOLVED: That the Town Council of the Town of North Kingstown endorses the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee.

Jeannette Alyward
Town Clerk

Town of
North Stonington, Connecticut

July 11, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, Rhode Island 02832

Dear Mr. Henry:

At the North Stonington Board of Selectmen meeting held on July 10, 2018, at the North Stonington New Town Hall, 40 Main Street, the Board voted to endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and the recommendation to seek Wild and Scenic Rivers designation though an act of the United States Congress, with the understanding that the designation would not involve National Park Service ownership or management of lands, by a unanimous vote of 3-0. The pertinent minutes are attached.

Thank you for your attention to this matter.

Respectfully,

Michael A. Urgo
First Selectman

attachment

40 Main Street, North Stonington, Connecticut 06359 Phone 860-535-2877/Fax 860-535-4554

Town of Richmond, Rhode Island

Richmond Town Hall
5 Richmond Townhouse Road
Wyoming, RI 02898
(401) 539-9000 x9
www.richmondri.com

Sarah S. Rapose
Town Clerk
Probate Clerk
Canvassing Clerk
townclerk@richmondri.com

June 20, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Water Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry,
At a Town Council meeting held on June 19, 2018 at the Richmond Town Hall, the Town Council voted to endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and the recommendation to seek Wild and Scenic Rivers designation through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands, by unanimous vote of 4 to 0.

Very truly yours,

Sarah S. Rapose
Richmond Town Clerk

Town of South Kingstown, Rhode Island

TOWN CLERK'S OFFICE

180 High Street
Wakefield, RI 02879
Tel. 401-789-9331

July 2, 2018

Sean Henry
Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

We are in receipt of your letter dated May 22, 2018 requesting support for Wild and Scenic designation of the seven rivers in the Wood-Pawcatuck Watershed and endorsement of the Stewardship Plan.

At their meeting held on Monday June 25, 2018, the Town Council voted to support the designation of seven rivers of the Wood-Pawcatuck Watershed as a Partnership Wild and Scenic Rivers, and endorsed the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan.

A copy of the Town Council resolution is enclosed for your reference.

Very truly yours,

Susan M. Flynn

Susan M. Flynn, CMC
Deputy Town Clerk

Enclosure

cc: Town Manager
Senior Planner

Town of Sterling

Town Hall
1183 Plainfield Pike
P.O. Box 157
Oneco, Connecticut 06373-0157

Assessor: 860-564-3030
Building Official: 860-564-2275
Economic Development: 860-564-4752
Library: 860-564-2692
Recreation: 860-564-2136
Registrar of Voters: 860-564-2654

Revenue Collector: 860-564-7563
Selectmen: 860-564-2904
Town Clerk: 860-564-2657
Treasurer: 860-564-8488
Wetlands Agent: 860-564-2275
Zoning Official: 860-564-2275

Town of Sterling
State of Connecticut

RESOLUTION
Adopted June 20, 2018

BE IT RESOLVED, that the Town of Sterling hereby supports the recommendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed – Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers – as a Partnership Wild and Scenic Rivers through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands, and

BE IT FURTHER RESOLVED, that the Board of Selectmen endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee.

Russell M Gray
Russell M. Gray, First Selectman

TOWN OF STONINGTON

SELECTMAN'S OFFICE
ROB SIMMONS
FIRST SELECTMAN

152 Elm Street • Stonington, Connecticut 06378
(860) 535-5050 • Fax (860) 535-1046
rsimmons@stonington-ct.gov

June 28, 2018

Mr Sean Henry, Chairperson
Wood Pawcatuck Wild and Scenic Rivers Study Committee
C/O Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry: Sean:

The Board of Selectmen at a regular meeting held on June 27, 2018 voted unanimously to endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and the recommendation to seek Wild and Scenic Rivers designation through an act of the United States Congress.

All the best,

Robert R. "Rob" Simmons
First Selectman

Let me know if you are going to Washington DC to promote this and I'll go along!!.

OFFICE OF THE SELECTMEN

115 Main Street
P.O. Box 96
Voluntown, CT 06384
Telephone: 860 376-5880
Fax: 860 376 - 3295

BE IT RESOLVED, that the Town of Voluntown hereby supports the recommendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed – Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers – as a Partnership Wild and Scenic Rivers through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands

And

BE IT FURTHER RESOLVED, that the Board of Selectmen endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee.

TOWN OF WEST GREENWICH, RHODE ISLAND

A RESOLUTION FOR SUPPORT OF THE DESIGNATION OF SEVEN RIVERS OF THE WOOD-PAWCATUCK WATERSHED

RESOLUTION: 2018-3

WHEREAS, the West Greenwich Town Council met in regular session on June 13, 2018; and

WHEREAS, a motion was made by Vice President Rekas Sloan, seconded by Councilman Boyer, passing the following resolution by a unanimous vote:

RESOLVED, that the Town Council of the Town of West Greenwich, hereby supports the recommendation for designation of Seven Rivers of the Wood- Pawcatuck Watershed- Beaver, Chipuxet, Green, Fall, Pawcatuck, Queen, Shunock, and Wood Rivers as Wild and Scenic Rivers through an act of the United States Congress; and

BE IT FURTHER RESOLVED, that the Town Council endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee.

ATTEST:

Erin F. Liese, Town Clerk

Town of Westerly

Town Hall • 45 Broad Street • Westerly, Rhode Island 02891
TEL: (401) 348-2522 • FAX: (401) 348-2528

17/18-175

RESOLUTION IN SUPPORT OF THE WOOD-PAWCATUCK WILD AND SCENIC RIVERS STEWARDSHIP PLAN AND THE RECOMMENDATION FOR WILD AND SCENIC RIVERS DESIGNATION

WHEREAS, the Wood-Pawcatuck Wild and Scenic Study Committee has developed a Stewardship Plan to protect the seven rivers within the Wood-Pawcatuck watershed and is seeking national recognition of the rivers through a Wild and Scenic Rivers designation; now therefore, be it hereby

RESOLVED, that the Town Council of the Town of Westerly hereby supports the recommendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed – Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers – as a Partnership Wild and Scenic Rivers through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands; and

BE IT FURTHER RESOLVED, that the Town Council of the Town of Westerly endorses the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Study Committee.

Edward P. Morrone, President

William J. Aiello, Vice President

Jean L. Gagnier

John P. Carson, Sr.

Philip M. Overton

Mario P. Celico

Karen A. Cioffi

ATTEST:

Donna L. Giordano, MMC, Town Clerk

ADOPTED: June 18, 2018

CT DEEP

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF THE DIRECTOR
235 Promenade Street, Room 425
Providence, Rhode Island 02908

July 17, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry,

I am writing to confirm the strong and enthusiastic support of the Rhode Island Department of Environmental Management (DEM) for the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. These amazing rivers offer exceptional recreational opportunities for paddlers, birders, fisherman, and anyone who enjoys scenic waterways. They contain thousands of acres of wetlands providing habitat for a high diversity of fish, amphibians, reptiles, mammals and invertebrates.

The outstandingly remarkable values of the Beaver, Chipuxet, Green Fall - Ashaway, Pawcatuck, Queen - Usquepaugh, Shunock, and Wood Rivers include clean, cold water habitat that supports brook trout and large numbers of invertebrate species. The watershed provides critical habitat for wildlife in deep forests, shrublands, vernal pools, undeveloped riparian corridors and wetlands. Rich agricultural fields, sites of long abandoned industry, mill villages with remnants of homes, schools and churches and extensive Native American ceremonial stonework are important cultural features found within the watershed that tell important stories of the region's past.

DEM also heartily endorses the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. Careful and strategic stewardship of state lands within the Wood Pawcatuck watershed is based upon resource protection, forest health and habitat management. Best management practices assure a balanced approach to assuring both public recreation and resource protection. RI DEM embraces the opportunity to be an active participant in the ongoing stewardship work that will safeguard the land and waters of this spectacular watershed.

In addition to this endorsement, I want to express appreciation for the dedication and hard work of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee. The representatives of eleven towns from two states along with partner organizations worked tirelessly for nearly three years under the guidance of Committee Chair, Sean Henry and Study Coordinator, Denise Poyer

Letters of Support from Town Committees, Community Partners, and Other Supporters

AMC NARRAGANSETT CHAPTER
YOUR CONNECTION TO THE OUTDOORS

March 13, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
C/O Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Appalachian Mountain Club to confirm our organization's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Board of Directors on behalf of our over 2,700 members at our meeting on March 13, 2018. Enclosed is a copy of the motion from that meeting.

Over many decades, our chapter has led hikes, paddles, bike rides and held conservation activities in the Wood/Pawcatuck watershed. The chapter maintains many miles of hiking trails and bridges in the study area, has re-built the picnic pavilion near in the upper wood basin, The chapter was instrumental in constructing a hiker bridge over the Wood River near route 165.

Granting this Wild and Scenic designation would ensure that not only our members, but others with myriad interests and appreciation for the watershed could continue their activities knowing the Wood/Pawcatuck was permanently protected.

Sincerely,

Linda M. Pease

Linda M. Pease
Conservation Chair and Paddling Sub Chair
Appalachian Mountain Club - Narragansett Chapter (RI Chapter)

Connecting People with Nature

Audubon Society of Rhode Island

November 1, 2017

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

The Audubon Society of Rhode Island supports the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and its recommendation to seek Wild and Scenic Designation.

The Wood and Pawcatuck Rivers are important resources to Audubon. Two of Audubon's refuges, Fisherville Brook and the Eppley Sanctuary are on the Queen River, one of Rhode Island's most pristine river systems. The Queen's River, a cold, largely forested stream with headwaters in West Greenwich. The river flows southwestward through the tiny villages of Liberty and Usquepaug before joining the Pawcatuck River in South Kingstown.

We appreciate the dedicated work of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and support their findings and recommendations.

Sincerely,

Lawrence Taft
Executive Director

12 Sanderson Road ~ Smithfield, RI 02917-2600 ~ Phone: (401) 949-5454 ~ Fax: (401) 949-5788
www.asri.org email: Audubon@asri.org

Avalonia Land Conservancy, Inc.
PO Box 49
Old Mystic, CT 06372
(860) 884-3500
www.avalonialandconservancy.org

June 27, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of Avalonia Land Conservancy, Inc. to confirm the organization's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Avalonia Board of Directors at its meeting on June 27, 2018.
Enclosed is a copy of the motion from that meeting.

Very truly yours,

Dennis S. Main, President

Avalonia Land Conservancy, Inc. preserves natural habitats in southeastern Connecticut by acquiring and protecting lands and by communicating the value of these irreplaceable resources.

Charlestown Land Trust
P.O. Box 1387
Charlestown, RI 02813

June 15, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Charlestown Land Trust to confirm the Board support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Board at our meeting on June 13, 2018. The motion was unanimous to support the Stewardship Plan and the recommendation for the Wild and Scenic Designation.

Thank you all for the work you have done to protect our rivers.

Very truly yours,

Karen Jarret

Karen Jarret
President- Charlestown Land Trust

Denison Pequotsepos Nature Center

27 June 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr Henry-:

Summer greetings from the Denison Pequotsepos Nature Center (DPNC)! I am writing in support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee's efforts to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. DPNC is one of the oldest (longest running) environmental organizations in CT, since 1946. We have a long history of year-round programs within the watershed including birding trips, canoe/kayak explorations, summer camp outings, cultural and natural history tours. hikes, school trips and more. These include partnerships with WPWA, local/regional schools, Westerly Land Trust, The Nature Conservancy, RI and CT ornithological and botanical societies and other groups. The watershed and its rivers offer countless sites and opportunities for us to connect people to nature through first-hand experiences, educational programs and activities. Our region, including the areas encompassed by the Wood Pawcatuck watershed, is part of an important cultural landscape that preserves unique history, nature and sense of place that enriches our lives.

Sincerely,

Maggie

Margarett L Jones
Executive Director

P.O. Box 122 • Mystic, CT 06355 • (860) 536-1216 • Fax (860) 536-2985 • www.dpnc.org

Our mission: To inspire an understanding of the natural world and ourselves as part of it - past, present and future.

Hopkinton Conservation Commission
1 Town Hall Road
Hopkinton, Rhode Island 02833

December 15, 2017

Hopkinton Town Council
1 Town House Road
Hopkinton, RI 02833

Re: Wild and Scenic Rivers Study Support

Dear President Landolfi and Town Council Members:

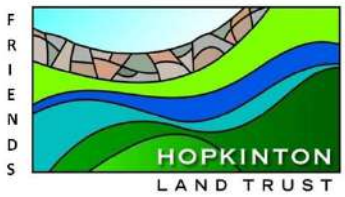
At our November meeting, the Hopkinton Conservation Commission viewed a presentation given by Maureen Kennelly of the Wild and Scenic Rivers Study Committee. This Study includes rivers in the Wood/Pawcatuck watershed and encompasses 14 cities and town in both Connecticut and Rhode Island.

The Conservation Commission voted to support this effort to recognize the special qualities of our rivers and we encourage the Hopkinton Town Council to do so as well.

Very truly yours,

Deborah O'Leary
Secretary
Hopkinton Conservation Commission

Cc: Denise Poyer, WPWA
Maureen Kennelly



PO Box 1132, Hope Valley, RI 02832

4 June 2018

To: Hopkinton Town Council

Re: National Wild & Scenic Rivers Designation

We, the Friends of the Hopkinton Land Trust, are fully aware and are in complete support of the National Wild & Scenic Rivers Designation. We are so fortunate to live near these beautiful rivers and we are grateful for the efforts of all of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee!

Best wishes for continues success. If we can be of further support, please get in touch with us.

Christine Anderson

Friends of the Hopkinton Land Trust

friendsofthehopkintonlandtrust@gmail.com

HOPKINTON
RHODE ISLAND

PLANNING DEPARTMENT
James M. Lamphere, Town Planner
One Townhouse Road
Hopkinton, Rhode Island 02833
401-377-7770

September 5, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Sean:

I am writing on behalf of the Hopkinton Planning Board to confirm our support for the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan and its recommendation to seek Wild and Scenic Designation. This position was taken by a formal vote of the Hopkinton Planning Board at their meeting on September 5, 2018. Please see below for the motion from that meeting:

"Al DiOrio made a motion, seconded by Tom Holberton, for the Hopkinton Planning Board to support the Wood-Pawcatuck Wild and Scenic River Stewardship Plan. Passed unanimously."

Very truly yours,

Al DiOrio
Chairperson

Narragansett Chapter of Trout Unlimited (TU225)
203 Arcadia Road
Hope Valley, Rhode Island 02832

July 19, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry,

Thank you for the Herculean effort you and your team of volunteers have put into this study. All of us at The Narragansett Chapter of Trout Unlimited (TU225) truly apricate the need to protect this very precious resource.

I am writing on behalf of our organization to confirm our support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed.

We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. The Stewardship Plan agrees with our chapters Vision; *To ensure that the habitats for cold-water and estuary fish thrive in Rhode Island for future generations*, and Mission; *To conserve, protect, restore, and sustain the cold-water fisheries and their watersheds in Rhode Island through collaborative, educational, and environmental activities*.

This position was taken by a formal vote by the Board of Directors Meeting on July 18, 2018

Very truly yours,

Glenn Place

President
Narragansett Chapter TU225
1-401-225-7712

"HE LEARNED, BECAME OLDER, WISER AND, YES, BIGGER. HE BECAME A BETTER FISH, AND TO CATCH HIM, I WOULD HAVE TO BECOME A BETTER MAN." *(Louis Cahill)*

Practice conservation for the fish because they cannot do it for themselves!!

http://narragansett.tu.org

North Stonington
C·I·T·I·Z·E·N·S
Land Alliance
PO Box 327, North Stonington CT 06359

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of The North Stonington Citizens Land Alliance, Inc. to confirm the Alliance's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and its recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed.

We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. These positions were taken by a formal vote of the North Stonington Citizens Land Alliance Board of Trustees at our meeting on July 23, 2018.

The motion we passed is written and signed below.

Very truly yours,

William Hixson
Board of Trustees

Motion: Approved July 23, 2018

The North Stonington Citizens Land Alliance appreciates and supports both the Wood-Pawcatuck Wild and Scenic Rivers Study Committee's recommendations to seek both the National Wild and Scenic Rivers designation for its seven watershed rivers, including the Shunock and Green Fall Rivers in North Stonington, as well as its Stewardship Plan.

TEL: 860-599-5517 EMAIL: LANDALLIANCEINC@GMAIL.COM WEB: WWW.LANDALLIANCE.ORG

Town of
North Stonington, Connecticut

July 6, 2018

Board of Selectmen
Town of North Stonington
40 Main Street
North Stonington, CT, 06359

Dear Selectmen:

The Conservation Commission is unanimously supportive of the efforts to designate the Wood-Pawcatuck Rivers a federally designated Wild and Scenic River and ask for your support as well.

The Conservation Commission has recognized the need for protection of our water resources from the outset of this organizations efforts and supported with the previous administration, the current North Stonington volunteers in representing us in this effort.

As the mission of the Conservation Commission affirms: We are *"For the development, conservation, supervision, and regulation of natural and historic resources, including water resources, within its territorial limits."* Both the Green River and the Shunock River, along with numerous tributaries, among them Miller Brook, the Assekonk, and Wyassup Stream feed the Wood-Pawcatuck River system. As south-east Connecticut grows, it is incumbent upon us to protect these valuable natural resources at all costs.

Please add our letter to this effort.

Yours truly,

William Ricker, Chairman
Mike Charnetski
Dr. Steven Colgan
Robert DeGoursey
Douglas Farrand
Dr. Jason Mancini
Dr. Arnie Vlieks

40 Main Street, North Stonington, Connecticut 06359 Phone 860-535-2877/Fax 860-535-4554

NORTH STONINGTON HISTORICAL SOCIETY
One Wyassup Road, P.O. Box 134
North Stonington, Connecticut 06359

July 30, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Rd.
Hope Valley, RI 02832

Dear Sean:

I am writing on behalf of the North Stonington Historical Society, Inc. to confirm the Society's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers.

Very truly yours,

Frank N. Eppinger, President
North Stonington Historical Society, Inc.

FNE/cab

c: Richard Seager (via email: dickseager@comcast.net)
Madeline Jeffery

TOWN OF

North Stonington, CT.

Inland Wetlands Commission

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf on the North Stonington Inland Wetlands Commission to confirm their support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed.

We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a vote of the Commission at our meeting on June 13, 2018. Enclosed is a copy of the vote from that meeting.

Very truly yours,

Mark Grigg, Chairman
Inland Wetlands Commission

MG/ck

40 Main Street, North Stonington, CT. 06359

Town of

North Stonington, CT

PLANNING AND ZONING

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, Rhode Island 02832

Dear Mr. Henry:

I am writing on behalf of the North Stonington Planning and Zoning Commission to confirm their support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed.

We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Commission at our meeting on June 7, 2018. Enclosed is a copy of the motion from that meeting.

Very truly yours,

Lou Steinbrecher/ck

Lou Steinbrecher, Chairperson
North Stonington Planning & Zoning Commission

40 Main Street, North Stonington, CT 06359 Phone 860-535-2877/Fax 860-535-4554

Rhode Island Rivers Council
c/o RI Water Resources Board
RI Department of Administration
One Capitol Hill
Providence, RI 02908
www.ririvers.org info@ririvers.org

November 15, 2017

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Rhode Island Rivers Council to confirm the Council's support for the Wood-Pawcatuck Watershed Wild and Scenic Rivers designation. This position was taken by a formal vote of the Council at their meeting on November 15, 2017. Enclosed is a copy of the minutes from that meeting.

We wish you all the best as you proceed with your efforts toward obtaining Wild and Scenic designation for the Wood-Pawcatuck Watershed.

Very truly yours,

Veronica Berounsky, Chair
Rhode Island Rivers Council

Rhode Island Canoe and Kayak Association

January 4, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Rhode Island Canoe and Kayak Association (RICKA) to confirm the Association's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Association at their meeting on January 3, 2018. Enclosed is a copy of the motion from that meeting.

Very truly yours,

Sharon Dragon

Sharon Dragon, President
Rhode Island Canoe and Kayak Association

State of Rhode Island and Providence Plantations
State House
Providence, Rhode Island 02903-1196
401-222-2080

Gina M. Raimondo
Governor

September 27, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I write to express my strong support for the recommendation of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. Rhode Island is proud to be part of a bi-state partnership devoted to protecting the cultural and natural resources of this watershed that serves as the sole source of drinking water for more than 60,000 residents and supports roughly 70 percent of Rhode Island's imperiled species.

The RI Department of Environmental Management (DEM) has worked with partners for many years to conserve critical lands in the Wood-Pawcatuck Watershed to protect and restore habitat and water quality and to allow for public recreational enjoyment of the rivers. From land acquisition, to research, to projects to improve the connectivity of the rivers, this area has been a top priority for our state's conservation and outdoor recreation programs. I wholeheartedly endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers and commend the Wood-Pawcatuck Wild and Scenic Rivers Study Committee for all for the effort that has brought the study to this pivotal recommendation. I also commend the leadership of the Wood-Pawcatuck Watershed Association.

With its unique geology, exceptional ecosystems, excellent water quality, and remarkable recreational opportunities, the Wood-Pawcatuck Watershed is deserving of this important Congressional designation. The Watershed's rivers should be protected for the benefit and enjoyment of present and future generations, and being named National Wild and Scenic Rivers would support such preservation.

Sincerely,

Gina M. Raimondo
Governor

Town of Richmond, Rhode Island
5 Richmond Townhouse Road, Wyoming, RI 02898
(401) 539-9000 x9 Fax: (401) 539-1089
www.richmondri.com

June 20, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Richmond Conservation Commission (RCC) to confirm that the RCC has received and reviewed the final Wood-Pawcatuck Wild and Scenic Rivers Study Plan, dated June 2018, and the RCC supports the Study Committee's recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. The RCC endorses the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan as an important means to help protect these rivers including those within the Town of Richmond and in eleven other towns in Rhode Island and Connecticut. This position was taken by motion and formal vote of the RCC at its meeting on June 20, 2018. A copy of the RCC motion and vote outcome is available in the Town of Richmond meeting note records.

Thank you for all the in-depth work that has completed for these efforts over the last several years. The RCC greatly appreciates the Committee's efforts and looks forward to our rivers being collectively designated as a federal Wild and Scenic River.

Very truly yours,

James G. Turek
Chairperson
Richmond Conservation Commission

cc: Sarah Rapose, Richmond Town Clerk

Town of Richmond, Rhode Island
5 Richmond Townhouse Road, Wyoming, RI 02898
www.richmondri.com

May 24, 2018

Sean Henry, Chairperson (Wood-Pawcatuck Wild and Scenic Rivers Study Committee)
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry,

The Planning Board of the Town of Richmond heard a presentation from Peter Paton, the Town of Richmond's representative on the Study Committee, on May 22, 2018 regarding the Committee's application for National Wild and Scenic Designation of the Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers and the associated draft Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan.

The Planning Board unanimously voted to support the identification of these waterways as possessing the necessary Outstandingly Remarkable Values for official federal recognition. The Board was also unanimous in its support of the Stewardship Plan as drafted, though noted that Trout Unlimited should have a representative on the Stewardship Council for their continued conservation efforts to restore and maintain river ecosystems and fisheries in the Watershed.

Warm regards,

Juliana M. Berry, Town Planner and BPZ Department Head

cc: Richmond Town Council

SAVE THE BAY
NARRAGANSETT BAY

September 24, 2018

Denise Poyer, Study Coordinator
Wood-Pawcatuck Wild and Scenic Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road, Hope Valley, RI 02832

RE: Save The Bay support for the Partnership Wild and Scenic River Designation for the Wood-Pawcatuck River

Dear Denise:

As one of the largest non-profit, environmental groups in southern New England, Save The Bay represents the voices of thousands of environmentally-aware members and supporters committed to preserving, restoring, and protecting the ecological integrity and value of Narragansett Bay, coastal Rhode Island, and the entire watershed. On behalf of the organization, I am writing to express our overwhelming support of Wild and Scenic designation of the Wood-Pawcatuck Rivers.

The seven river segments contained within the Wood-Pawcatuck watershed contain more rare and endangered species than anywhere else in the region. These amazing rivers offer exceptional recreational opportunities for paddlers, birders, and fisherman. In addition, they contain thousands of acres of wetlands providing critical habitat for a high diversity of fish, amphibians, reptiles, mammals and invertebrates.

It is our hope that National Wild and Scenic designation will strengthen bi-state relationships and lead to greater efforts by local communities, state and Federal agencies, and environmental organizations to work together. Providing long term protection of these river systems is the best way to protect the environmentally sensitive and diverse habitats that stretch from its headwaters to Little Narragansett Bay.

It has been an honor and privilege to serve on the study committee and we look forward to working with the Wild and Scenic Stewardship Council as they implement the Wood Pawcatuck Stewardship Plan. We strongly recommend that Congress designate this ecologically significant region as a Wild and Scenic river system.

Sincerely,

David Prescott
South County Coastkeeper®
South Coast Center
Westerly, RI

THE BAY CENTER
100 Save The Bay Drive
Providence, RI 02905
phone: 401-272-3540
fax: 401-273-7153

EXPLORATION CENTER
Easton's Beach
P.O. Box 851
Newport, RI 02840
phone: 401-324-6020
fax: 401-324-6022

SOUTH
COAST CENTER
Riverside Building
8 Broad Street
Westerly, RI 02891
phone/fax: 401-315-2709

savebay@savebay.org
www.savebay.org

Town of South Kingstown, Rhode Island

PLANNING DEPARTMENT
180 High Street
Wakefield, RI 02879
Tel (401) 789-9331 x1244
Fax (401) 789-9792

CONSERVATION COMMISSION

June 6, 2018

Honorable Town Council
South Kingstown Town Hall
180 High Street
Wakefield, RI 02879

Dear Council Members:

I am writing on behalf of the Conservation Commission to confirm the Commission's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Commission on June 6, 2018.

Very truly yours,

DM

David Flanders, Chair
Conservation Commission

South Kingstown Land Trust

Open Space Makes All the Difference

July 20, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the South Kingstown Land Trust to confirm our organization's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Board of Trustees at our meeting on February 8, 2017. Enclosed is a copy of the motion from that meeting.

Very truly yours,

Martha Day, President
Board of Trustees

227 Robinson Street, Wakefield, Rhode Island 02879 ph 401-789-0962 fax 401-789-9898 www.sklt.org

TOWN OF SOUTH KINGSTOWN
PLANNING DEPARTMENT
MEMORANDUM

TO: Robert C. Zarnetske, Town Manager
FROM: Doug McLean, Senior Planner DM
SUBJECT: Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan
DATE: June 19, 2018

This memorandum is provided as background information on the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan for Town Council consideration at its June 25, 2018 regular meeting. The Stewardship Plan was developed by a Study Committee coordinated through the Wood-Pawcatuck Watershed Association (WPWA) and is available for download here: http://wpwildrivers.org/study-committee/. Please see the attached letter from Sean Henry, Chairperson of the Study Committee, requesting that the Town Council pass a resolution to support the Wild and Scenic River designation and to endorse the Stewardship Plan.

Denise Poyer, Project Coordinator for the WPWA, will attend the Town Council meeting on June 25th to provide a brief overview of the Stewardship Plan and answer any questions as it pertains to South Kingstown's participation moving forward. As part of the municipal evaluation process, the Conservation Commission reviewed the Stewardship Plan at its June 6, 2018 regular meeting and provided the attached letter of support for the Town Council's consideration. Planning Department staff also reviewed the Plan and finds that it is comprehensive, based on empirical analysis, and contains valuable information for potential implementation moving forward. It should be noted that the Plan includes a series of action strategies as voluntary measures that individual towns, states, federal, or non-profit agencies may wish to institute on their own or in conjunction with the Wild and Scenic Rivers Council.

If the Town Council is comfortable proceeding in this regard, the following resolution is provided for its consideration:

> "BE IT RESOLVED, that the South Kingstown Town Council hereby supports the recommendation for designation of Seven Rivers of the Wood-Pawcatuck Watershed – Beaver, Chipuxet, Green Fall-Ashaway, Pawcatuck, Queen-Usquepaugh, Shunock, and Wood Rivers – as a Partnership Wild and Scenic Rivers through an act of the United States Congress, with the understanding that designation would not involve National Park Service ownership or management of lands
>
> And
>
> BE IT FURTHER RESOLVED, that the South Kingstown Town Council endorses the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan developed by the Wood-Pawcatuck Wild and Scenic Rivers Study Committee."

Please advise if you have any questions on this memorandum or attachments.

w/enclosures

June 25, 2018
Board of Selectmen
Town of Stonington, CT

RECEIVED
JUN 29 2018
SELECTMANS OFFICE

Dear Board of Selectmen,

I am writing on behalf of the Stonington Conservation Commission to ask you to support the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for the seven rivers in the Wood- Pawcatuck Watershed. We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote the Conservation Commission at our meeting on 5/21/18.

Very Truly Yours,

James Friedlander
Conservation Commission

JUN 29 2018
Pam an- letter to them.

STONINGTON LAND TRUST

preservation for generations

November 30, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I'm writing on behalf of the Stonington Land Trust. At the Land Trust's Board Meeting on November 20, 2018, the Board of Directors had a formal vote in favor of supporting the Wood-Pawcatuck Wild and Scenic Rivers Study Committee. The motion passed unanimously.

Therefore, I'd like to confirm with you that the Board of Directors supports the sum total of the efforts of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee. In particular, we give whole-hearted support to the Committee's recommendation to seek National Wild and Scenic Designation for the seven rivers in the Wood-Pawcatuck Watershed.

Also, we support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan, which will ultimately protect the values of the seven rivers.

Thank you to everyone involved in the heroic efforts to protect the spectacular Wood-Pawcatuck Watershed!

Sincerely Yours,

Stanton Simm

Stanton Simm
Executive Director
Stonington Land Trust

P.O. Box 812 • Stonington, CT 06378 • www.stoningtonlandtrust.org

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy in Rhode Island
159 Waterman Street
Providence, RI 02906

tel [401] 331.7110
fax [401] 273.4902

nature.org/rhodeisland

June 12, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry,

I am writing to offer the full and unqualified support of The Nature Conservancy to this Committee for the recently completed stewardship plan and for your efforts to advance the Wood-Pawcatuck and their tributaries for designation as Wild and Scenic rivers under the National Park Service.

This Committee's work has been invaluable in making a solid case for the designation and building a strong constituency of people who know and love these rivers.

This unique and extraordinary river system is the last of its kind in Rhode Island and warrants the highest level of protection and conservation possible while allowing for its use and enjoyment by all people.

These rivers support some of the highest biodiversity in the region and serve as the foundation of local and regional identity, a thriving recreation and tourism economy, and they will be protected through these efforts for future generations.

Thank you for the opportunity to participate in this process. We look forward to continuing to work with you to secure this important designation.

Sincerely,

John Torgan
Rhode Island State Director

Tomaquag Museum
ENGAGE • EDUCATE • EXPERIENCE

390 A Summit Road
Exeter, RI 02822
Phone/Fax: (401) 491-9063

www.tomaquagmuseum.org
facebook.com/tomaquagmuseum
twitter.com/tomaquagmuseum

9-19-18

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Tomaquag Museum to confirm our organization's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers.

Tomaquag Museum has partnered with WPWA over many years providing environmental experiences combined with Indigenous cultural knowledge. WPWA staff have taught river watershed curriculum to Native youth at Tomaquag Museum including kick netting for macro-invertibrates, water quality testing and study of vernal pools. WPWA led kayaking programs for Native youth as well as partnered with the museum for public kayak tours sharing both the ecological and culture uses of the river. This knowledge is important both culturally and ecologically for next generations to pass down the use and care of the river systems and the adjoining resources.

Tomaquag Museum has always shared with the public the importance of the environment, the changes in the landscape overtime and how that effects the ecology through its initiatives and partnerships. This is why we have presented to WPWA staff, Board & constituents regarding the use of the river by the Indigenous Peoples. We believe the care and preservation of this Watershed is critically important environmentally and culturally. The stewardship of the rivers is of great importance to the whole community and adds to the vibrancy of our state.

Best,

Lorén M. Spears
Executive Director

Conservation Commission
Town of West Greenwich
280 Victory Highway

January 4, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Sean,

I am writing on behalf of the West Greenwich Conservation Commission to confirm the commission's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also support the development of the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by formal vote of the commission at their meeting on December 7, 2018. Enclosed is a copy of that motion from that meeting.

Very truly yours,

Christopher Grube, Chairperson
West Greenwich Conservation Commission

TEL: 401-392-3800
FAX: 401-392-3805

Town of West Greenwich

INCORPORATED 1741

MAILING ADDRESS
280 VICTORY HIGHWAY
WEST GREENWICH
RHODE ISLAND 02817-2113

January 23, 2018

WOOD – PAWCATUCK WATERSHED ASSOCIATION

203 ARCADIA ROAD

HOPE VALLEY, RI 02832

Attn: Sean Henry, Chairperson

Wood – Pawcatuck Wild and Scenic Rivers Study Committee

Dear Mr. Henry,

I am writing on behalf of the West Greenwich Planning Board, to confirm the Board's support of the Wood – Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood – Pawcatuck Watershed.

We also support the development of the Wood – Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers.

This position was taken by a formal vote of the Board at our regular meeting last night. Enclosed is a draft copy of the motion from that meeting.

Sincerely,

Brad Ward, Chair

West Greenwich Planning Board

Encl.

Cc: West Greenwich Conservation Commission

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Sean (Mr. Henry):

I am writing on behalf of the Westerly Conservation Commission to confirm the Commission's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Westerly Conservation Commission at their meeting on June 12, 2018. This motion and the subsequent approval will be included in the approved meeting minutes of that meeting.

Very truly yours,

Joseph T. MacAndrew
Westerly Conservation Commission Chairman

6/13/18
Date

THE WESTERLY LAND TRUST
30TH ANNIVERSARY
1987 2017

May 31, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Westerly Land Trust to confirm our organizational support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers as it is in alignment with one of our own missions of protecting these waterways. This position was taken by a formal vote of the Westerly Land Trust Board of Directors on May 4, 2018.

Thank you for your efforts in seeking this national designation for these invaluable natural resources in our State.

Sincerely,

Sheilia Terranova Beattie
Board President
Westerly Land Trust

P.O. Box 601, Westerly, RI 02891-0601 Tel: 401.315.2610 www.westerlylandtrust.org

WESTERLY MUNICIPAL
LAND TRUST

06/07/18

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Westerly Municipal Land Trust to confirm the committee's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken via consensus of the committee at our meeting on Nov. 27th 2017.

Very truly yours,

James J. Federico III, Chairperson
Westerly Municipal Land Trust

Town of Westerly
Rhode Island

RECREATION DEPARTMENT
Paul T. Duffy, Director

Tower Street
School Community Center
93 Tower Street
Westerly, RI 02891
TEL: (401) 348-2715
FAX: (401) 348-2281

June 11th, 2018

Sean Henry, Chairperson
Wood-Pawcatuck Wild and Scenic Rivers Study Committee
c/o Wood-Pawcatuck Watershed Association
203 Arcadia Road
Hope Valley, RI 02832

Dear Mr. Henry:

I am writing on behalf of the Westerly Recreation Board to confirm the Board's support of the Wood-Pawcatuck Wild and Scenic Rivers Study Committee and their recommendation to seek National Wild and Scenic Designation for seven rivers in the Wood-Pawcatuck Watershed. We also endorse the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan to protect the values of the rivers. This position was taken by a formal vote of the Recreation Board's membership at their meeting on June 6th, 2018.

Very truly yours,

Edward Haik PD

Edward Haik, Chairperson
Westerly Recreation Board

Appendix C:

References, Resources, and Experts Consulted

FEDERAL, STATE, AND TOWN ORDINANCES

Mason and Associates, Inc., 771 Plainfield Pike, North Scituate, RI 02857

FISHERIES

2016 Fish Stocking Report, Connecticut Department of Energy & Environmental Protection Bureau of Natural Resources, Fisheries Division, 79 Elm Street, Hartford, CT 06106 860-424-FISH (3474), www.ct.gov/deep/fishing

Inland Fishes of Rhode Island, Alan Libby, 2015, Rhode Island Department of Environmental Management

Personal communication with Rhode Island Department of Environmental Management, Fish and Wildlife staff 2010 to 2018

Personal communication with Connecticut Department of Energy & Environmental Protection Bureau of Natural Resources, Fisheries Division, 2017

Science News: Brook trout study identifies top climate change pressure factor, November 30, 2015

Shunock River Diadromous Fish Restoration Plan, Connecticut Department of Energy & Environmental Protection, Bureau of Natural Resources, Fisheries Division

GROUNDWATER

Availability of Ground Water Upper Pawcatuck River Basin Rhode Island, 1966, William B. Allen, Glenn W. Hahn, and Richard A. Brackley, Library of Congress catalog card No. GS 66-244

Online Aquifer Protection Area Program Technical Training for Municipal Officials - Offered by Connecticut Department of Energy and Environmental Protection. www.ct.gov/deep/cwp/view.asp?a=2685&q=322252&deepNav_GID=1654

U.S. Environmental Protection Agency Sole Source Aquifer Program www.epa.gov/dwssa

U.S. Environmental Protection Agency Region 1 Source Water Drinking Water Quality and Protection Unit OEP-2 Contacts: Kira Jacobs, 617-918-1683

HABITAT

Connecticut State Wildlife Action Plan, 2015 www.ct.gov/deep/wildlifeactionplan

Connecticut Green Plan: Comprehensive Open Space Acquisition Plan
www.ct.gov/deep/greenplan

Connecticut Wildlife Action Plan - 2015 Revision. Connecticut Department of Energy and Environmental Protection.
www.ct.gov/deep/cwp/view.asp?a=2723&q=329520&deepNav_GID=1719#Review

Forest Birds of Connecticut and Rhode Island. Robert J. Craig. Bird Conservation Research Contribution 23. 2017. This publication presents the distribution, patterns of population density and habitat associations of all forest bird species in CT and RI.

Freshwater Mussels of Connecticut
www.ct.gov/deep/cwp/view.asp?a=2723&q=325914&depNav_GID=1655

Great Thicket National Wildlife Refuge
www.fws.gov/northeast/refuges/planning/lpp/greatthicketLPP.html

Natural Communities of Rhode Island December 2006, Richard W. Enser, Rhode Island Natural Heritage Program, Department of Environmental Management and Julie A. Lundgren, The Nature Conservancy

Northeast Coastal Areas Study, Significant Coastal Habitats
nctc.fws.gov/resources/knowledge-resources/pubs5/necas/web_link/table%20of%20contents.htm

Personal communication with Connecticut Department of Energy & Environmental Protection Bureau of Natural Resources, Fisheries Division, 2017

Personal communication with Rhode Island Department of Environmental Management, Fish and Wildlife staff 2010 to 2018

Personal communication with Virginia Brown, regarding excerpts from future publication of Rhode Island Odonata Atlas

Rhode Island State Wildlife Action Plan, 2015
www.dem.ri.gov/programs/fish-wildlife/wildlifehuntered/swap15.php

The Status of Freshwater Mussels in Rhode Island, Author(s): Christopher J. Raithel and Raymond H. Hartenstine, Source: Northeastern Naturalist, Vol. 13, No. 1 (2006), pp. 103-116 Published by: Eagle Hill Institute, www.jstor.org/stable/4131010

HISTORIC

Mechanic Street Historic District – National Register of historic Places, National Park Service, US Department of the Interior, 7 June, 1988

National Register of Historic Places RI and National Registry Nominations, edited by Jeff Emidy

Native American Archaeology in Rhode Island, Rhode Island Historic Preservation Commission 2002

Native Americans and/or European Colonist Archaeological sites - Connecticut State Historic Preservation Office/Office of State Archaeology

The Pawcatuck River Navy, a history of shipbuilding on the Pawcatuck River, 2007, Dwight C Brown, Jr

Personal communication with Loren Spears, Director for the Tomaquag Museum www.tomaquagmuseum.org

Rhode Island Historic Preservation Commission, www.preservation.ri.gov

Rhode Island Royal Charter, 1663, royal recognition identifying the Pawcatuck River as part of the Rhode Island Border, Rhode Island State House, Providence

State Survey of the towns of Charlestown, Exeter, Hopkinton, Richmond, South Kingstown, West Greenwich and Westerly
www.preservation.ri.gov/survey/publications.php

LAND PROTECTION AND STEWARDSHIP

Avalonia Land Conservancy avalonialandconservancy.org

Charlestown Land Trust www.charlestownlandtrust.org

Connecticut Conservation and Development Policies Plan (State C&D Plan), 2018-2023 Revision www.ct.gov/opm/cwp/view.asp?a=2990&q=383182

Connecticut Land Conservation Council www.clcc.org

Connecticut Department of Energy and Environmental Protection Land Acquisition and Management www.ct.gov/deep/openspace

Exeter Land Trust www.town.exeter.ri.us/exeterlandtrust.html

Land Conservancy of North Kingstown lcnk.org

Richmond Rural Preservation Land Trust
www.richmondri.com/162/Richmond-Rural-Preservation-Land-Trust

Rhode Island Land Trust Council www.rilandtrusts.org

Rhode Island Department of Environmental Management Land Conservation Program www.dem.ri.gov/programs/planning/landacqusition/index.php

RI Parks and Recreation www.riparks.com

RI Aquatic Resource Education
www.dem.ri.gov/programs/fish-wildlife/aquatic-resource-education-program.php

South Kingstown Land Trust sklt.org

Stonington Land Trust www.stoningtonlandtrust.org

The Nature Conservancy
www.nature.org/ourinitiatives/regions/northamerica/unitedstates/rhodeisland

USDA Natural Resources Conservation Service
www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs

Watch Hill Conservancy www.thewatchhillconservancy.org

West Greenwich Land Trust www.wglandtrust.org

Westerly Land Trust westerlylandtrust.org

Westerly Municipal Land Trust westerlymunicipallandtrust.org

RECREATION

Connecticut State Boat Launches www.ct.gov/deep/boatlaunches

Connecticut Clean Marinas Program www.ct.gov/deep/cleanmarinas

Connecticut Coastal Access Guide www.ct.gov/deep/coastalaccessguide

Connecticut Fishing www.ct.gov/deep/fishing

Connecticut Trout Stocking Maps www.ct.gov/deep/troutstockingmaps

Connecticut Forest Management Plan: Pachaug State Forest
www.ct.gov/deep/lib/deep/forestry/management_plans/pachaugsf_wick_gf_glasgo_plan_hartford.pdf

Pachaug State Forest www.ct.gov/deep/pachaug

Pawcatuck River Wildlife Management Area – DEEP Eastern District Headquarters, Marlborough, CT, Wildlife Division (860) 295-9523

Rhode Island Hunting and Fishing Regulations
www.dem.ri.gov/programs/fish-wildlife/index.php

Town of Westerly, Rhode Island Memorandum, dated October 12, 2016, to Derrik Kennedy, Town Manager, from Jay Parker, Zoning Official – Westerly Rights-of-Ways Update Memo

WATER QUALITY

2016 Integrated Water Quality Report. State of Connecticut Department of Energy and Environmental Protection.
www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_iwqr_final.pdf

Assessing the Wood-Pawcatuck Watershed Association's Water Quality Monitoring Program, 2016, Prepared by Elise Torello wpwa.org/reports.php

Connecticut Integrated Water Resources Management Reports
www.ct.gov/deep/iwrm

Connecticut Integrated Water Quality Report www.ct.gov/deep/iwqr

Connecticut Pawcatuck River Bacteria Watershed TMDL (2014)
www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/pawcatuck_watershed_tmdl_final.pdf

Connecticut Streamflow Standards and Regulations (including classifications for Wood-Pawcatuck River watershed) www.ct.gov/deep/streamflow

The Pawcatuck River Estuary and Little Narragansett Bay: An Interstate Management Plan Adopted July 14, 1992, Timothy P. Dillingham, Rush Abrams, Alan Desbonnet, Jeffrey M. Willis
www.ct.gov/deep/lib/deep/water/watershed_management/wm_plans/pawcatuck.pdf

Rhode Island Integrated Water Quality Monitoring and Assessment Reporting
www.dem.ri.gov/programs/water/quality/surface-water/integrated-water-quality-monitoring.php

Rhode Island Water 2030, State Guide Plan Element Report #721, July 14, 2012

Shunock River Watershed Summary, Connecticut Department of Energy and Environmental Protection, 2012
www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/shunockriver1004.pdf

University of Rhode Island Cooperative Extension Watershed Watch Program
web.uri.edu/watershedwatch

Water Quality 2035, Rhode Island Water Quality Management Plan, State Guide Plan Element Report #121, October 13, 2016

Wood-Pawcatuck Watershed Action Plan – 2008
www.wpwa.org/documents/Watershed%20Action%20Plan%20revised%202008.pdf

Table 1. Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ACEC	Areas of Critical Environmental Concern
ADA	Americans with Disabilities Act
AMC	Appalachian Mountain Club
ATM	Annual Town Meeting
ATV	All-terrain vehicle
BMP	Best Management Practice
CE	Conservation Easement
CFR	Coldwater Fisheries Resource
CPA	Community Preservation Act
CR	Conservation Restriction
CRM	Cultural Resource Management
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTEMA	Connecticut Emergency Management Agency
DOT	Department of Transportation
DPW	Department of Public Works
DWPC	Division of Water Pollution Control
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Maps
FWS	Fish and Wildlife Service
GIS	Geographical Information Systems
GPS	Global Positioning System
IBA	Important Bird Area
LED	Light-emitting diode
LID	Low Impact Development
MS4	Municipal Separate Stormwater Sewer Systems
NEFF	New England Forestry Foundation
NGO	Non-Governmental Organization
NOAA	National Oceanic Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
ORRV	Outstandingly Remarkable Resource Values
RIDEM	Rhode Island Department of Environmental Management
RIEMA	Rhode Island Emergency Management Administration
PSA	Public Service Announcements
RPA	Rivers Protection Act
RPC	Regional Planning Commission

Acronym/ Abbreviation	Definition
SGCN	Species of Greatest Conservation Need
SWQS	Surface Water Quality Standards
USFWS	US Fish and Wildlife Service
USGS	US Geological Service
VRI	Visual Resource Inventory
WCE	Wildlife Conservation Easement
WCR	Wildlife Conservation Restriction
WMA	Wildlife Management Area
WRPOD	Water Resource Protection Overlay District
WWTF	Wastewater Treatment Facility

Table 2. Geographic Information Systems Datasets Used in Maps

Most spatial data were clipped to include only data in the HUC 10 Wood, Lower Pawcatuck, and Upper Pawcatuck subbasins.

Base data used in most maps: RI town boundaries from RIGIS, CT town boundaries from CT Dept. of Energy and Environmental Protection (DEEP)

Hydrologic data (rivers/streams, lakes/ponds, wetlands, sub-watershed boundaries, some dams) used in all maps: USGS National Hydrography Dataset

Roads data used in all maps that include roads: tl_2014_09011_roads, tl_2015_09015_roads, RIDOTrds10

Map Topic	Data for Connecticut and Rhode Island	Connecticut Data (CT Department of Energy and Environmental Protection (DEEP))	RI (RI Geographic Information System (RIGIS))
Aquifers		Aquifer_Protection_Area_shp, Surficial_Aquifer_Potential_shp	Groundwater Recharge, Groundwater_Reservoirs
Brook Trout	EBTJV Range-Wide Layers 09_22_16.gdb		
Dams		Dam_shp, Hydrography_gdb	dams12
Geology		Bedrock_Geology_shp, CTgeol_dd, Quaternary_Geology_shp	glacial
Historic Sites	National Parks Service NRIS_CR_Standards_Public.gdb		Historic_Candidate_Sites, Historic_Districts, Villages
Impervious	USGS nlcd_2011_impervious_2011_edition_2014_10_10		
Land Use	nlcd_2011_landcover_2011_edition_2014_10_10		
Locator Map	MassGIS (New England and Mass. Outlines)	CT DEEP	RIGIS
Natural Heritage Areas		Natural_Diversity_Database_shp	natHeritage16
Protected Land		nced_ct_easements, Property_gdb, protectedproperties	locCons14, staCons14,

Map Topic	Data for Connecticut and Rhode Island	Connecticut Data (CT Department of Energy and Environmental Protection (DEEP))	RI (RI Geographic Information System (RIGIS))
Recreation		DEP_Boat_Launch_shp, Shellfish_Area_Class_shp	Fishing_and_Boating_Access, Marinas
River Maps (All)	USGS National Hydrography Dataset, nlcd_2011_landcover_2011_edition_2014_10_10	Dam_shp, Hydrography_gdb	dams12
Terrain	USGS National Elevation Dataset grdn42w072_13		
Unfragmented Habitat Cores	Esri's Green Infrastructure Initiative www.arcgis.com/home/item.html?id=0d2f35395c3c43ecb7685df9be63dd84		
Wetlands	US Fish and Wildlife Service National Wetlands Inventory, HU8_01090005.gdb		

Appendix D:

State Endangered, Threatened, and Species of Concern, and Federally Listed Species in the Wood-Pawcatuck Watershed

Rhode Island and Connecticut
State Endangered (SE), State Threatened (ST), State Concern (SC)

Common Name	Genus	Species	RI/CT State Status
Vertebrates			
Northern Saw-whet Owl	*Aegolius*	*acadicus*	RI-SC
Grasshopper Sparrow	*Ammodramus*	*savannarum*	RI-ST
Whip-poor-will	*Caprimulgus*	*vociferous*	CT-SC
Northern Harrier	*Circus*	*Hudsonius*	CT-E
Cerulean Warbler	*Dendroica*	*cerulea*	SE
Pileated Woodpecker	*Dryocopus*	*pileatus*	RI-SC
Acadian Flycatcher	*Empidonax*	*virescens*	RI-SC
Northern Parula	*Parula*	*americana*	RI-ST
Prothonotary Warbler	*Protonotaria*	*citrea*	RI-SC
Eastern Spadefoot	*Scaphiopus*	*holbrookii*	CT-E/RI-SE
Wood Turtle	*Clemmys*	*insculpta*	RI-SC
Black Rat Snake	*Elaphe*	*obsoleta*	RI-SC
Eastern Hognose Snake	*Heterodon*	*platirhinos*	RI-SC
Bobcat	*Lynx*	*rufus*	RI-ST
Smoky Shrew	*Sorex*	*fumeus*	RI-SC
Red Bat	*Lasiurus*	*borealis*	CT-SC
Banded Sunfish	*Enneacanthus*	*Obesus*	CT-SC
Brindle Shiner	*Notropis*	*bifrenatus*	CT-SC
Invertebrates			
Spatterdock Darner	*Aeshna*	*mutata*	RI-SC
Comet Darner	*Anax*	*longipes*	RI-SC
Blueberry Sallow	*Apharetra*	*dentata*	RI-SC
A Noctuid Moth	*Aplectoides*	*condita*	RI-SC
Dusted Skipper	*Atrytonopsis*	*hianna*	RI-SC
Bombardier Beetle	*Brachinus*	*patruelis*	CT-SC
Sparkling Jewelwing	*Calopteryx*	*dimidiata*	CT-T
Hessel's Hairstreak	*Callophrys*	*hesseli*	CT-E/RI-SC
Hoary Elfin	*Callophrys*	*polios*	RI-SC
Frosted Elfin	*Callophrys*	*irus*	RI-ST
Henry's Elfin	*Callophrys*	*henrici*	CT/RI-SC
Pine Barrens Tiger Beetle	*Cicindela*	*formosa*	RI-ST
Arrowhead Spiketail	*Cordulegaster*	*obliqua*	RI-SC
Atlantic bluet	*Enallagma*	*doubledayi*	CT-T

Common Name	Genus	Species	RI/CT State Status
Pine Barrens Bluet	*Enallagma*	*recurvatum*	RI-SC
Scarlet Bluet	*Enallagma*	*pictum*	CT/RI-SC
Northern Pearly Eye	*Enodia*	*anthedon*	RI-SC
Sleepy Duskywing	*Erynnis*	*brizo*	RI-SC
Northern Oak Hairstreak	*Fixsenia*	*favonius*	RI-SC
Bog Tiger Moth	*Grammia*	*speciosa*	RI-SC
Coastal Barrens Buckmoth	*Hemileuca*	*maia*	RI-SC
Woolly Beach-heather	*Hudsonia*	*tomentosa*	CT-T
Golden-winged Skimmer	*Libellula*	*auripennis*	RI-SC
Pale Green Pinion Moth	*Lithophane*	*viridipallens*	RI-SC
Lilaeopsis	*Lilaeopsis*	*chinensis*	CT-SC
Black Lordithon Rove Beetle	*Lordithon*	*niger*	RI-SC
Bog Copper	*Lycaena*	*epixanthe*	CT/RI-SC
Eastern pearlshell	*Margaritifera*	*margaritifera*	CT-SC
Coastal Swamp Metarranthis	*Metarranthis*	*pilosaria*	RI-SC
Brook Snaketail	*Ophiogomphus*	*aspersus*	RI-ST
Pitcher Plant Borer Moth	*Papaipema*	*appassionata*	RI-SC
White M Hairstreak	*Parrhasius*	*m-album*	RI-SC
Common Sanddragon	*Progomphus*	*obscurus*	RI-SC
Coppery Emerald	*Somatochlora*	*georgiana*	RI-SC
Zebra Clubtail	*Stylurus*	*scudderi*	RI-ST
Coastal Swamp Amphipod	*Synurella*	*chamberlaini*	RI-SC
Ringed Boghaunter	*Williamsonia*	*lintneri*	RI-SE
A Noctuid Moth	*Zale*	*submediana*	RI-SC
Pine Barrens Zale	*Zale*		RI-SC
Plants			
Sandplain Gerardia, Agalinis	*Agalinis*	*acuta*	RI-SE
Colic-root, Stargrass	*Aletris*	*farinosa*	RI-SC
Wild Leek, Ramp	*Allium*	*tricoccum*	
		var. tricoccum	RI-SC
Wild Spikenard, Life-of-man	*Aralia*	*racemosa*	RI-SC
Arethusa, Swamp-pink, Dragon's Mouth	*Arethusa*	*bulbosa*	RI-SE
Slimspike Three-awn, Northern Poverty-grass	*Aristida*	*longespica*	
		var. geniculata	RI-SC
Wild Ginger	*Asarum*	*canadense*	RI-SC

Common Name	Genus	Species	RI/CT State Status
Blunt-leaved or Clasping Milkweed	*Asclepias*	*amplexicaulis*	RI-SC
Poke or Tall Milkweed	*Asclepias*	*exaltata*	RI-SC
Butterfly-weed, Pleurisy-root	*Asclepias*	*tuberosa*	RI-SC
Maidenhair Spleenwort	*Asplenium*	*trichomanes*	RI-SC
Purple Screwstem	*Bartonia*	*iodandra*	RI-SC
Purplestem or Swamp Beggar-ticks, Stick-tight	*Bidens*	*connata*	RI-SC
Northern Tickseed-sunflower	*Bidens*	*coronata*	RI-SC
Daisy-leaved Moonwort	*Botrychium*	*matricariifolium*	RI-SC
Grass-pink, Swamp-pink	*Calopogon*	*tuberosus* *var. tuberosus*	RI-SC
Pale or Tall Corydalis, Rock-harlequin	*Capnoides*	*sempervirens*	RI-SC
Collin's Sedge	*Carex*	*collinsii*	RI-SE
Bog-sedge	*Carex*	*exilis*	RI-SC
(Variable) Sedge	*Carex*	*polymorpha*	RI-SE
Bent Sedge	*Carex*	*styloflexa*	RI-SC
(Walter's) Sedge	*Carex*	*striata*	RI-SE
Tuckerman’s sedge	*Carex*	*tuckermanii*	CT-SC
Yellow Blue-bead Lily	*Clintonia*	*borealis*	RI-SC
Squaw-root, Cancer-root	*Conopholis*	*americana*	RI-SC
Spotted Coral-root	*Corallorhiza*	*maculata* *var. maculata*	RI-SC
Late or Autumn Coral-root	*Corallorhiza*	*odontorhiza* *var. odontorhiza*	RI-SE
Early, Pale, or Northern Coral-root	*Corallorhiza*	*trifida*	RI-SC
Rose Coreopsis, Pink Tickseed	*Coreopsis*	*rosea*	RI-SC
Low Rockrose	*Crocanthemum*	*propinquum*	RI-SC
Little-leaf or Hairy Small-leaved Tick-trefoil, Beggar's-ticks, or Tick-clover	*Desmodium*	*ciliare*	RI-ST
Sessile-leaved Tick-trefoil, Beggar's-ticks, or Tick-clover	*Desmodium*	*sessilifolium*	RI-ST
Tall swamp rosette panicgrass	*Dichanthelium*	*scabriusculum*	CT-E
Wild Yam	*Dioscorea*	*villosa*	RI-SC
(Horsetail) Spike-rush	*Eleocharis*	*equisetoides*	RI-SC
(Black-fruited) Spike-rush	*Eleocharis*	*melanocarpa*	RI-SE

Common Name	Genus	Species	RI/CT State Status
Long-tubercled Spikesedge	*Eleocharis*	*tuberculosa*	RI-SC
Blunt Spike-rush	*Eleocharis*	*ovata*	RI-SC
Marsh Willow-herb	*Epilobium*	*palustre*	RI-ST
River Horsetail	*Equisetum*	*fluviatile*	RI-SC
Bog Cotton-grass, Dark-scale Cotton-grass	*Eriophorum*	*viridicarinatum*	RI-SC
Large-leaved or Big-leaved Aster	*Eurybia*	*macrophylla*	RI-SC
Showy Aster	*Eurybia*	*spectabilis*	CT-T
Black Ash	*Fraxinus*	*nigra*	RI-SC
Creeping Snowberry, Moxie, Moxieplum, Maidenhair-berry	*Gaultheria*	*hispidula*	RI-ST
Dwarf Huckleberry	*Gaylussacia*	*bigeloviana*	RI-SC
Fringed-gentian	*Gentianopsis*	*crinita*	RI-ST
Herb-robert	*Geranium*	*robertianum*	RI-SC
Woodland-sunflower	*Helianthus*	*divaricatus*	RI-SC
Featherfoil, Water-violet	*Hottonia*	*inflata*	CT/RI-SC
Water Pennywort	*Hydrocotyle*	*umbellate*	CT-E
Golden Heather	*Hudsonia*	*ericoides*	RI-ST
Creeping St. John's-wort	*Hypericum*	*adpressum*	RI-ST
Hairy Pine-sap	*Hypopitys*	*lanuginosa*	RI-SC
Small Whorled Pogonia, Little Five-leaves	*Isotria*	*medeoloides*	RI-SE
Inkberry	*Ilex*	*glabra*	CT-T
Carolina Redroot	*Lachnanthes*	*caroliniana*	RI-ST
Eastern Grasswort	*Lilaeopsis*	*chinensis*	RI-SE
Canada Lily, Wild Yellow Lily	*Lilium*	*canadense*	RI-ST
Sandplain or Bicknell's Yellow Flax	*Linum*	*intercursum*	RI-SE
Common Yellow Flax	*Linum*	*medium ssp. texanum*	RI-SC
Lily-leaved or Large Twayblade	*Liparis*	*liliifolia*	RI-SE
Yellow, Bog-, or Loesel's Twayblade, Fen-orchid	*Liparis*	*loeselii*	RI-SE
Water-lobelia, Water-gladiole	*Lobelia*	*dortmanna*	RI-SC
Wild, Mountain-, Glaucous, or Limber Honeysuckle	*Lonicera*	*dioica*	RI-SC

Common Name	Genus	Species	RI/CT State Status
Mountain Fly-honeysuckle, Waterberry	*Lonicera*	*villosa*	RI-SC
Round-fruited or Round-pod Water-primrose or False Loosestrife	*Ludwigia*	*sphaerocarpa*	RI-SE
Wild Lupine, Sundial-lupine	*Lupinus*	*perennis ssp. perennis*	RI-SC
Foxtail-clubmoss	*Lycopodiella*	*alopecuroides*	RI-ST
Climbing or Hartford Fern	*Lygodium*	*palmatum*	RI-SC
Green Adder's Mouth	*Malaxis*	*unifolia*	RI-SE
Ostrich Fern	*Matteuccia*	*struthiopteris ssp. pensylvanica*	RI-SC
Early Saxifrage	*Micranthes*	*virginiensis*	RI-SC
Mountain- or Smooth Sandwort, "mountain-daisy"	*Minuartia*	*glabra*	RI-ST
Wild Bergamot	*Monarda*	*fistulosa var. mollis*	RI-SE
One-flowered Pyrola or Shinleaf	*Moneses*	*uniflora*	RI-ST
Lion's-foot Rattlesnake-root	*Nabalus*	*serpentarius*	RI-SE
Bog Aster	*Oclemena*	*nemoralis*	CT-E
Northern Adder's-tongue	*Ophioglossum*	*pusillum*	RI-SE
Golden-club	*Orontium*	*aquaticum*	RI-SE
One-sided Pyrola or Shinleaf	*Orthilia*	*secunda*	RI-ST
Anise-root, Long-styled Sweet Cicely	*Osmorhiza*	*longistylis*	RI-ST
Violet Wood-sorrel	*Oxalis*	*violacea*	RI-SE
Ditch-stonecrop	*Penthorum*	*sedoides*	RI-SC
Long or Northern Beech-fern	*Phegopteris*	*connectilis*	RI-ST
Black Spruce, Bog-spruce	*Picea*	*mariana*	RI-SC
Slender Mountain-rice, Ricegrass	*Piptatherum*	*pungens*	RI-SC
Sickle-leaved or Falcate Golden Aster	*Pityopsis*	*falcata*	RI-ST
Hoary Plantain	*Plantago*	*virginica*	CT-SC
White-fringed Bog-orchid	*Platanthera*	*blephariglottis*	RI-ST
Orange Fringed Bog-orchid	*Platanthera*	*ciliaris*	RI-SE
Northern Tubercled Bog-orchid	*Platanthera*	*flava var. herbiola*	RI-SE
Small Purple Fringed Orchid	*Platanthera*	*psycodes*	RI-SC

Common Name	Genus	Species	RI/CT State Status
Drum-heads, Cross-leaved Milkwort, Marsh-milkwort	*Polygala*	*cruciata ssp. aquilonia*	RI-SC
Nuttall's Milkwort	*Polygala*	*nuttallii*	CT-T
Whorled Milkwort	*Polygala*	*verticillata*	RI-SC
Swamp-cottonwood, Black Cottonwood	*Populus*	*heterophylla*	RI-ST
Tuckerman's pondweed	*Potamogeton*	*confervoides*	CT-E
Comb-leaved Mermaid-weed	*Proserpinaca*	*pectinata*	RI-SC
Sand-cherry	*Prunus*	*susquehanae*	RI-SC
Dwarf Chestnut- or Chinquapin-oak	*Quercus*	*prinoides*	RI-SC
Small-flowered Crowfoot	*Ranunculus*	*micranthus*	RI-ST
White Water-crowfoot or Buttercup	*Ranunculus*	*trichophyllus*	RI-ST
Pinxter (or Pinkster)-flower, Election-pink, Purple Honeysuckle	*Rhododendron*	*periclymenoides*	RI-SC
(Innundated) Beak-rush, Horned-rush	*Rhynchospora*	*inundata*	RI-SE
(Large-spiked) Beak-rush, Horned-rush	*Rhynchospora*	*macrostachya*	RI-ST
Torrey's Beak-rush	*Rhynchospora*	*torreyana*	RI-SE
Plymouth Gentian, Marsh-pink	*Sabatia*	*kennedyana*	RI-SE
Grass-leaved or Grassy Arrowhead	*Sagittaria*	*graminea var. graminea*	RI-SC
Slender or Quill-leaved Arrowhead	*Sagittaria*	*teres*	RI-SE
Bloodroot, Red Puccoon	*Sanguinaria*	*canadensis*	RI-SC
Podgrass	*Scheuchzeria*	*palustris*	RI-SE
Swamp-bulrush	*Schoenoplectus*	*etuberculatus*	RI-SE
Bluntscale-bulrush, Smith's Clubrush	*Schoenoplectus*	*smithii var. smithii*	RI-ST
Swaying Rush, Water-bulrush, Water-clubrush	*Schoenoplectus*	*subterminalis*	RI-SC
Torrey-threesquare, Torrey's Bulrush	*Schoenoplectus*	*torreyi*	RI-SC
Long's Bulrush	*Scirpus*	*longii*	RI-SE

Common Name	Genus	Species	RI/CT State Status
(Few-flowered) Nut Rush, Carolina-whipgrass	*Scleria*	*pauciflora var. caroliniana*	RI-ST
(Three-clustered) Tall Nut-rush, Whipgrass	*Scleria*	*triglomerata*	*RI-ST*
Indian Grass, Wood-grass	Sorghastrum	nutans	RI-SC
Little Ladies'-tresses	*Spiranthes*	*tuberosa*	RI-SE
Spring Ladies'-tresses	*Spiranthes*	*vernalis*	RI-SC
Hyssop or Hyssop-leaved Hedge-nettle	*Stachys*	*hyssopifolia*	RI-ST
Smooth Blue or Smooth Aster	*Symphyotrichum*	*laeve*	RI-SC
Goat's-rue, Catgut, Rabbit's-pea	*Tephrosia*	*virginiana*	RI-SC
Purple, Waxy, or Skunk Meadow-rue	*Thalictrum*	*revolutum*	RI-SE
Rue-anemone	*Thalictrum*	*thalictroides*	RI-SC
Gama-grass, Sesame-grass	*Tripsacum*	*dactyloides*	RI-SC
(Two-flowered) Bladderwort	*Utricularia*	*biflora*	RI-ST
Paired or Mixed Bladderwort	*Utricularia*	*geminiscapa*	RI-SC
Flat-leaved Bladderwort	*Utricularia*	*intermedia*	RI-SC
Reversed or Resupinate Bladderwort	*Utricularia*	*resupinata*	RI-SC
Zigzag Bladderwort	*Utricularia*	*subulata*	RI-SC
Swamp-haw, Possum-haw, Southern Wild Raisin	*Viburnum*	*nudum var. nudum*	RI-ST
Downy Yellow Violet, Smooth Yellow Violet, Yellow Forest-violet	*Viola*	*pubescens var. pubescens*	RI-SC
Round-leaved or Early Yellow Violet	*Viola*	*rotundifolia*	RI-SC
Wood Violet	*Viola*	*subsinuata*	RI-SC
Small's yellow-eyed	*Zyris*	*smalliana*	CT-E
Wild Rice	*Zizania*	*aquatica var. aquatica*	RI-SC

CT Critical Habitats:
Acidic Atlantic White Cedar Swamp
Medium fen
Poor fen
Salt Marsh

CT Critical Habitats depicts the classification and distribution of twenty-five rare and specialized wildlife habitats in the state. It represents a compilation of ecological information collected over many years by state agencies, conservation organizations and many individuals. This information can serve to highlight ecologically significant areas and to target areas of species diversity for land conservation and protection. Biologists may use this data to target further research on associated plant and animal species.

RI Heritage Communities:
Deep Emergent Marsh
Dwarf Shrub Fen/Bog
Atlantic White Cedar Swamp
Coastal Plain Pondshore
Coastal Plain Quagmire
Acidic Graminoid Fen
Inland Dune/ Sand Barren
Pitch Pine - Scrub Oak Barrens
Floodplain Forest

RI Heritage Communities are natural communities that were identified in Enser and Lundgren (2006) as "rare" in Rhode Island.

Notes:
- For simplicity and for data security, no sites were given
- CT species list was provided by CT DEEP Natural Diversity Data Base.
- RI lists and statuses are the more recent official state lists: Enser 2006 for animals and RINHP 2016 for plants. The heritage communities are drawn from Enser and Lundgren 2006. All these citations are available on the Survey website here: http://rinhs.org/partners-resources/download-pubs/
- Absence of evidence does not equal evidence of absence.
- These all have sightings in the last 40 years (back thru 1979). RI has no program for systematic resurvey so in many cases the lack of a more recent date just means no one's been to look.

Federally Listed Species:

Common Name	Genus	Species	Federal Status
Animals			
Piping Plover	*Chadarius*	*melodus*	Threatened
Roseate tern	*Sterna*	*dougallii dougallii*	Endangered
Red Knot	*Calidris*	*canutus rufa*	Threatened
Northern Long-eared Bat	*Myotis*	*septentrionalis*	Threatened
Plants			
Sandplain gerardia	*Agalinis*	*acuta*	Threatened
Small whorled pogonia	*Isotria*	*medeoloides*	Endangered

Not listed but high priority species for conservation:

New England Cottontail	*Sylvilagus*	*transitionalis*