



## WOOD - PAWCATUCK *Wild and Scenic Rivers*

### ***OUTSTANDINGLY REMARKABLE VALUES***

*This subsection describes the natural and cultural resource values supported by the Wood-Pawcatuck Watershed that are deemed to meet the “Outstandingly Remarkable” threshold. More detailed information on these resource values can be found on the Study website at [www.wpwildrivers.org](http://www.wpwildrivers.org). All of the resources cited contribute to the overall eligibility of the Wood-Pawcatuck Watershed for designation. Not all river reaches in the study area support all noted outstanding values, but there is no stretch of river which does not contribute to the viability of the whole. For the most part, these values are deemed to be outstanding values significant in the aggregate, except where otherwise noted.*

The Wild and Scenic Study Committee was tasked with identifying and researching potential Outstandingly Remarkable Values (ORV) associated with the watercourses as required by the Wild and Scenic Rivers Act. Not just one, but four categories of ORVs were identified. The examination of these resources was accomplished through substantial research that was conducted prior to and during the Study, and included evaluation of the significance of the resources within a state-wide and regional context by means of consultations with experts and professionals.

The resources fall within the following categories: **Geology/Hydrology, Watershed Ecosystems, Cultural, and Scenic/Recreation.**

#### ***Geology and Hydrology***

The most significant ORV of the Wood-Pawcatuck Watershed is the geological 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 Rte. 1 in RI, 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 current 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.

This 300 square-mile primarily rural watershed is approximately 70 percent wooded- the forested landscape safeguards the streams’ excellent water quality. In addition, high quality wetlands offer protection of water quality both in the tributaries and in the mainstem Wood and Pawcatuck. An analysis of total phosphorus results, done for WPWA’s 2015 report, demonstrates the excellent water quality found throughout the watershed.

Most of rivers and streams in the Wood, Shunock, Green Falls, Beaver, Chipuxet, and Queen segments are found to be the highest water quality, Class A. This classification has among its designated uses potential drinking water supply and fish and wildlife habitat.

The 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 URI and parts of South Kingstown. Most all of the watershed contains high quality water. Protection of this important resource is vital since no alternative viable surface water supplies are readily available. The importance of protecting hydrologic resources is recognized by both Connecticut and Rhode Island.

More urban portions of the watershed include the Westerly-complex and South Kingston. The lower water quality segments result from nonpoint source pollution, resulting in segments of waterways within the watershed being included on the Rhode Island 2012 303(d) List of Impaired Waters. There are two municipal wastewater facilities discharging to the Pawcatuck River in the tidal portion of the river; United Water Treatment Plant in the Town of Westerly and the Stonington Waste Water Treatment Plant. Kenyon Industries in the towns of Charlestown and Richmond is the only industrial plant with a Rhode Island Pollution Discharge Elimination System (RIPDES) permit currently discharging into the Pawcatuck River. The other industry with a RIPDES permit, Bradford Dye Association, closed in early 2012.

Additional causes of impairment are fecal coliform, nutrients, metals, wastewater effluent, and non-native aquatic plants. The Charbert Dye Company property is a site with long-term ground water contamination. It is located in the Village of Alton along the Wood River, just downstream of the Alton Pond Dam and one-mile upstream of the confluence with the Pawcatuck. The contamination was discovered in 2008 when the plant closed. In the intervening years, monitoring and remediation plans were developed, and have been undertaken. The RI DEM maintains a record of activity related to this site.

**Connecticut segments 18, 19, 20: Pawcatuck River:** Classification B, B\*, SB; Category 5  
**Wood River:** Classification A; Category 1  
**Shunock River:** Classification A; Category 1  
**Green Falls River:** Classification A; Category 1

**Rhode Island segments 21, 22: Fresh Water Segments:**

**Beaver River:** Classification A; Category 2

**Chipuxet River:** Classification A; Category 2

**Pawcatuck River:** Classification B; Category 2

**Queen River:** Classification A; Category 2

**Wood River:** Classification A; Category 4A

**Salt Water Segments: Tidal Pawcatuck River:** Classification SA; Category 4A

Overall, water quality is considered to be excellent and greatly improved from the days of textile mill waste and sewage direct discharge to the waterways. In particular, the tidal area of the Pawcatuck River is not supporting for contact recreation, shell fish and aquatic life. The Wood-Pawcatuck Watershed Association (WPWA) and the University of Rhode Island Cooperative Extension Watershed Watch (WW) in conjunction with other local partners and volunteers, employs a comprehensive water quality monitoring program. In addition, Rhode Island

Department of Environmental Management conducts extensive water quality monitoring under their rotating basins schedule. The Wood-Pawcatuck Watershed was most recently monitored for this program in 2012. A more detailed documentation of the baseline conditions can be found in the Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan.

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

- 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 RI. 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.
- Indicators of high water quality include the large diversity of habitat, including cold-water river habitat that supports freshwater mussels and native brook trout. Also indicative of high water quality is the existence of river invertebrates, reptiles and amphibians.
- Green Fall Rift Valley (in the Green Falls region) is one of the more notable geologic features in the watershed. More of a shear than a rift, its tectonic history is one of an extensional falling apart, snapping apart, of weakened bedrock in a linear fault pattern, a lineament. During the assemblage and subsequent breakup of the Pangea supercontinent, the southern RI and CT borderlands region was geologically traumatized. Western North Stonington presently 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.
- An unusual topographic feature is the headwaters of the Queen River, Dead Swamp in West Greenwich. One of the only places in the region, this wetland flows into two separate watersheds – the Wood-Pawcatuck Watershed and the Pawtuxet River Watershed. Near the village of Usquepaugh the Queen River is part of a large outwash plain, which contains significant agricultural fields. The Queen 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 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.

## *Watershed Ecosystem*

This unique convergence of geology and hydrology have created exceptional ecosystems throughout the watershed, supporting over 70% of the regions 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, which makes it regionally significant. It was found by the EPA Resource Protection Study to contain the highest incidence of large, contiguous, forested areas in southeastern New England. Due to the lack of development and large forested tracts the watershed remains one of the darkest area 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 on-going fish passage restoration programs. Most of the rivers and streams in the watershed are coldwater fisheries, supporting native brook trout and freshwater muscles.

### Some Key Findings on the Exemplary Status of Exceptional Ecosystems in the Wood-Pawcatuck Watershed

- The Beaver Rivers is 91% undeveloped and heavily forested. Nearly half the river runs through protected properties held by RIDEM, The Nature Conservancy and local land trusts. Due to these large areas of unbroken forested blocks, the Beaver River provides clean, cold water habitat 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 entire three miles of the Chipuxet River, from Taylor's Landing to Worden Pond is undeveloped. This stream is an intricate component of the Great Swamp, the largest swamp in the region. Filled with a large variety of wetland plants, the habitat supports many aquatic dependent species of invertebrates, birds, mammals, amphibians and reptiles. The area is a National Natural Landmark.
- The Green Fall River is a forested green river corridor. From its top, a long section of the river runs through the Patchaug State Forest, the state's largest forest, 27,000 acres that extends through 5 towns and is enclosed by The Pawcatuck Borderland lands as part of New England's coastal forest eco-region, dark skies project. The Green Fall River is part of the Great Thicket National Wildlife Refuge. Three-quarters of Green Fall River flows within the Patchaug-Ledyard block of 6-state refuge system to help recreate and manage shrubland acreage for over 40 species of wildlife. Several surrogate species including Connecticut's American Cottontail Rabbit (ACR), whose presence is of special importance to this area, prairie warbler, blue-winged warbler, field sparrow, American woodcock, and brown thrasher represent the entire suite of shrubland wildlife needing young forest. Present birders who have roamed the newly created North Stonington Wyassup Road Refuge extol the number and variety of birds already.
- Bell Cedar Swamp is a significant Atlantic white cedar swamp that drains into the Wyassup Brook and Green Fall River. It is composed 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 adders mouth orchid, nettled chain fern, and the Hessel's Hairstreak butterfly.

- 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 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 Patchaug 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.
- The Nature Conservancy and Audubon Society of RI have protected several large tracts in the Queen River because of its high biodiversity, especially of dragonflies. According to the RI Odonata Atlas this river has the highest number of 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 are part of the western border of the Great Swamp. Both sections are 90% undeveloped.

## *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 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-18<sup>th</sup> 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 18<sup>th</sup> century political power shifted to the more mercantilist cities such as Newport, Bristol and Providence. In the 18<sup>th</sup> and 19<sup>th</sup> centuries, European communities developed as mill villages along the watershed's rivers to harness water power for saw, grist and carding mills. 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 Falls Rivers* contain many fine examples of early to late industrial mill buildings and structures. This assembly of historical mill villages was identified by the NPS for a potential "Thematic Group" designation on the National Register of Historic Places.

Important agricultural resources are found on outwash plains near the *Queen, Chipuxet, Beaver, Pawcatuck, and Green Falls Rivers*.

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. Hillsdale produced textiles, primarily Negro cloth, 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.
- 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, Clark's 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.
- There are three state documented tribal camping/fishing/settlements of the Pequots and Eastern Pequot Tribes along the Shunock River. Ceremonial stone sites are also found throughout the area and with more discoveries continuing. Historic early mills and villages were a result of the socio economic 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 Assekong 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 1700's 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 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.

## *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 out to Long Island Sound and the Atlantic Ocean. The many conservation areas 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'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 Patchaug 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 renown 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. Motorize boats are found primarily in the estuary and two short upstream stretches which are deep enough to allow them. Otherwise the Pawcatuck Rivers is primarily enjoyed by canoeist, kayakers, and stand up paddlers. There are two river front 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. It is within an hour drive of anywhere in RI and eastern CT. Because of its forested banks and clean, cold water, trout can find pools of refuge even in the heat of summer, making this a regional destination for fly fisherman. RIDEM 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. Paddlers come to the Wood River

to experience of a wild, natural river, with its many twists and turns and small class II rapids. 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 water fowl.

### Wood-Pawcatuck Watershed ORV Descriptions by River Segments

River Segment	ORV category	Landscape Feature
<b>Watershed-wide</b>	Geology/hydrology	Recessional moraine formed the Great Swamp, Cedar Swamp, and Chapman Swamp; sole source aquifer
	Ecology	Critical habitat contains large forested blocks and multiple wetlands; 50% of the regions rare and endangered species; part of the New England dark sky region
	Cultural	Native American archeological sites; historic dams, mills, and mill villages
	Recreation/Scenic	Over 56 miles for non-motorized boats; river corridors provide fishing, hunting, birding, hiking, and camping
<b>Beaver River</b>	Ecology	91% undeveloped, large areas of unbroken forested blocks,
	Ecology	cold/clean water habitat supporting invertebrates , Wild Brook Trout, vernal pools, wood frogs, spotted salamanders
	Cultural	Hillsdale Historic and Archaeological District
<b>Chipuxet River</b>	Ecology	Undeveloped 3 miles of the River form a key part of the Great Swamp; National Natural Landmark
	Cultural	Rich agricultural fields on outwash plains
	Recreation	Slow meander allows for scenic paddling, hunting, fishing, birding opportunities; South County Bike Path crosses River
<b>Green Fall River</b>	Geology/Hydrology	Green Fall Rift Valley

	Ecology	Great Thicket National Wildlife Refuge; Federal and State listed species
	Ecology	Bell Cedar Swamp – Atlantic White Cedar Swamp
	Cultural	Clark’s Falls and Shady Glen mill villages; 5 remaining working farms
	Cultural	Native America ceremonial stonework
	Recreational	Green Fall Recreation Area
<b>Pawcatuck River</b>	Geology	Worden Pond – largest freshwater lake in RI; Charlestown Moraine creates east west passage and many large swamps
	Cultural	Narragansett Indian archaeological sites at Pawcatuck
	Cultural	Nine historic mill sites
	Recreation	Motorized and non-motorized boating; fishing; camping
	Scenic	Marshes and swamps along the waterway, rural wooded landscape
<b>Queen/Usgeupaugh River</b>	Ecology	Highest number river Odonata count in the region; high number of freshwater mussels
	Ecology	Western border of the Great Swamp; National Natural Landmark
	Geology/Hydrology	Headwaters of the Queen River - Dead Swamp
<b>Shunock River</b>	Ecology	Cold water fisheries, CT DEEP Class 3 Wild Trout Management Area
	Cultural	3 state documented tribal settlements of the Pequots and Eastern Pequot Tribes

	Cultural	Significant early mill history established the town of North Stonington
<b>Wood River</b>	Ecology	Upper Wood River supports the highest biodiversity of any river in New England
	Ecology	Large tracts of undeveloped forests; contains over 50% of regions rare and endangered species
	Recreation	Fly fishing; exceptional kayaking
	Cultural	Native American quarry site and winter camps
	Cultural	7 historic dams, mills and mill villages
	Scenic	Forests, wetlands, native species