

# WATERSHED

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A Newsletter of the Wood-Pawcatuck Watershed Association

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## **Bacterial pollution in Pawcatuck Estuary subject of two-state study**

**T**he Rhode Island Department of Environmental Management (DEM) and the Connecticut Department of Environmental Protection (DEP) joined forces to conduct a study designed to characterize bacteria problems in the Pawcatuck River and Little Narragansett Bay. Representatives from the state agencies will present the results of the study to WPWA at a special meeting at WPWA headquarters on October 16.

The tidal Pawcatuck River forms the boundary between Westerly, Rhode Island and Stonington, Connecticut. Starting at the Route 1 Bridge, it flows approximately five miles to its terminus at Pawcatuck Point, where it flows into Little Narragansett Bay. Elevated bacteria levels impair water quality of both the tidal Pawcatuck River and Little Narragansett Bay; the Pawcatuck River is additionally impaired by low dissolved oxygen concentrations. Both Rhode Island

and Connecticut have placed these waterbodies on their states' list of impaired waters.

The study involved staff from several state and federal agencies including the DEM's Office of Water Resources, the Connecticut DEP, the Connecticut Division of Agriculture's Bureau of Aquaculture, the US Food and Drug Administration, and the US Environmental Protection Agency.

During the study, the Rhode Island and Connecticut shorelines, from the freshwater Pawcatuck River to Napatree Point, were surveyed to identify all actual and potential bacteria sources to the river. Samples were taken from all such sources flowing into the river from shore. In-stream samples were collected along the length of the Pawcatuck River during the first two days of the shoreline survey. All samples were analyzed for fecal coliform bacteria, an indicator of pathogen contamination. Source samples with elevated values were re-

sampled and their sources investigated.

DEM will use the information gathered to complete a water quality restoration plan that addresses the bacterial contamination to the tidal Pawcatuck River and Little Narragansett Bay. Such plans, known as TMDL (Total Maximum Daily Load), are mandated by the federal Clean Water Act and establish the maximum pollutant load that a waterbody can assimilate and still meet water quality standards. The information collected will also be used by both the Rhode Island and Connecticut shellfish programs to comply with the National Shellfish Sanitation Program's 12-year shoreline survey requirement.

Currently, Rhode Island's classification of the tidal Pawcatuck River prohibits the harvesting of shellfish. Elevated bacteria levels may also prevent those waters from supporting safe swimming under some conditions. Because of elevated bacteria levels, Rhode  
*(cont'd page 7)*



## Regional schools team up to monitor the Wood River

By Denise Poyer

The Wood River has served as outdoor science classroom for Chariho Middle School students for the past two years. Students monitor physical, chemical, and biological properties of the river as part of their science curriculum. This year, Exeter-West Greenwich Regional Junior High School (EWGJH), and the Nuweetooun School in Exeter, will join in this initiative, by coordinating their monitoring efforts in other parts of the Wood River watershed with the work that is being done by Chariho students. Each school will use water quality monitoring to emphasize parts of their science curriculum. Together the three schools hope to involve their students in “real world” science and make a contribution to their communities. WPWA will have a supporting role in their projects.

Educators Dan Potts (CMS), Beth Brocato (EWG) and Jerry Keane (NWT) met with WPWA staff over the summer to discuss water quality monitoring. WPWA is serving as advisor, monitoring coordinator, data publisher, and professional resource for the schools. Several important items were agreed upon by the group. Of prime concern to WPWA is that all three schools use the same methods for their testing. This way, results can be accurately compared between the schools. Also decided was where each school will do their work in the watershed. Mr. Potts classes have been monitoring the mainstem of the Wood River, from Rt. 165 in Exeter, to near Alton Pond in

Richmond (Alton). Mr. Keane’s students will begin studying Roaring Brook, which lies adjacent to their school, Dawley Swamp (also known as Sweeny Swamp), and Dawley Brook. Ms. Brocato’s classes will examine other streams in the Wood River headwaters, including Breakheart Brook, Acid Factory Brook, and Parris Brook.

The teachers decided to use the Carolina Biological Limnology kit for most of the testing. This kit can measure dissolved oxygen, temperature, pH, phosphates, nitrates, and hardness. Another aspect of the river ecology the schools will look at is benthic aquatic macroinvertebrates. The students will conduct an informal survey of which orders are present at each of the stream sites they study. Presence or absence of certain orders, such as stoneflies and mayflies, offer a rough estimate of the water quality. All the classes will use the same physical survey sheets that CMS has been using for some years.

Since CMS students are most experienced at this type of monitoring, they will take the lead in training teachers and students at the other schools. Plans were made for Nuweetooun School to accompany CMS classes on one of their sampling sessions in September. In addition, CMS students will make a presentation to EWGJH students in November regarding monitoring methods and some of the results they have obtained. WPWA will also assist

with training teachers in macroinvertebrate identification and interpretation.

Collaboration among the schools will result in monitoring efforts more widely spread over the watershed, and better interpretation of results. Meanwhile, students are learning about scientific methods, data management, ecology, watersheds, human impacts and much more. Most importantly, they are learning about issues that are important to their communities, and are gathering information that will be useful to their towns, WPWA,

and the scientific community.

Results from the tri-school monitoring effort will be posted on our website, [www.wpwa.org](http://www.wpwa.org), and in our newsletter.



Chariho students demonstrate water quality testing for News Channel 10 viewers.

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## RIDEM Aquatic Resource Ed offers fall fly tying classes

RIDEM Division of Fish and Wildlife Aquatic Education Program is offering eight fly tying courses for beginner and intermediate fly-tyers.

Classes will be held Tuesdays from 7–9pm at the North Kingstown Community Center, from October 24 through December 19.

Professional instructors will teach participants how to tie a variety of salt water and freshwater flies.

All materials are included and children over 10 are welcome!

Fee: \$7.00 per class, or \$55.00 for all eight sessions. For info and registration call Kimberly Sullivan at 789-0281.

## Summary of water quality data adjacent to Richmond stump dump

By S. Saila, T. Boving, D. Poyer

From April to August of 2006, the Wood-Pawcatuck Watershed Association employed a number of tools, including in-situ electronic data loggers, to assess changes in specific conductance in Canob Brook, as well as chemical analysis of water samples to investigate concentrations of boron in the brook and a nearby groundwater well. The purpose of this material is to contribute to the assessment of environmental effects from the disposal of woody debris, and subsequent pesticide applications, which have occurred in the vicinity of the above site known as "Richmond Stump Dump," located between Route 3 and Route 95 at the intersection of Skunk Hill Road, in Richmond RI.

A preliminary search of the literature was made in an effort to determine the probable effects of woody debris on stream ecology. A list of 477 references was found in the Aquatic Science and Fisheries Abstracts literature. Perusal of this literature did not locate any documents clearly demonstrating adverse effects of natural woody debris, except for changing the substrate composition when found in excessive amounts.

It is known that a boric-acid-containing cockroach bait (Niban) has been applied at the site in an attempt to control a massive cockroach infestation of properties surrounding the dump site. However, only limited information on the effects of boron on living organisms has been provided to date. This information is found in

Annex 1 of this report (attached). It states that the granular bait Niban contains 5 percent boric acid as the active ingredient. The bait remains active outdoors until it is exposed to 1.5 to 2 inches of rainfall. This suggests that the boric acid dissolves into the rain water which then disperses underground or into open streams.

The information which follows summarizes the critical levels of boron for several organisms and compares these with results of toxicity from chemical analysis of water from various sites near the stump dump. Annex 2 illustrates the effects of boron on a wide spectrum of organisms.

There are two primary messages from these data: first, that fish (especially early life history stages) are the most sensitive aquatic organisms to boron; and second, the suggestion that a boron level greater than 1 mg/liter of water may cause adverse environmental effects, especially to early life history stages of fishes and amphibians.

An additional search was made of the literature base of Aquatic Science and Fisheries Abstracts in order to obtain additional published reports of critical boron values. Annex 3 contains these values and the names of the organisms involved. It seems evident from these data that early life history stages of amphibians as well as fish may be very sensitive to boron. Although the critical values of boron are somewhat variable, it should be noted that boron levels above 1mg/liter may be damaging to some life history stages for both fishes and amphibians. As a minimum precaution, the use of boron containing pesticides

should be restricted to the fall and winter periods when sensitive larval stages of these organisms are not available.

The preliminary data available from the chemical analysis for boron is shown in Annex 4. This data set has been validated by a second analysis. It is evident that the levels of boron found in 3 of the 4 sites examined had boron levels above 1µg/liter (micrograms per liter) of water. Note that the boron levels reported in our analysis are in parts per billion (ppb), whereas the boron toxicity data reported in the literature is in parts per million (ppm). This means that, currently at least, the levels of boron found in our study are well below the levels which might be dangerous to humans and/or aquatic organisms.

However, we found that the levels of boron in ground water increase closest to the dumpsite. The presence of boron in groundwater near the dump site raises the question of whether these concentrations will increase or decrease over time. Because only one sampling round for boron was conducted, we believe that the water quality at this dump site deserves careful monitoring over a longer period of time (e.g. a year).

Our water analysis was limited to boron, but there may be other elements or compounds leaching from the dumpsite. An attempt will be made to analyze both groundwater and surface run-off for those toxic compounds that are typically associated with dump sites. These results will be made available to all interested parties. (*cont'd next page*)

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### **In-situ electronic data logging**

From January 27 to February 9, and from March 31 to April 19, 2006, WPWA deployed two YSI Data Sonde data loggers near the confluence of two first-order streams that flow into the Wood River above and below the site of the Richmond Stump Dump. These data loggers recorded measurements of dissolved oxygen, pH, temperature, and specific conductivity once every 15 minutes for the entire period of deployment. Data from the dissolved oxygen, pH, and temperature showed insignificant variations between the two sampling locations. However, specific conductivity data, which indicates the presence of dissolved particles in the water, showed statistically significant differences between the two sampling locations.

The first stream, referred to as Unnamed Stream, emerges out of Moonshine Swamp just east of Rte 95 and flows west into the Wood River north of Skunk Hill Road. The second stream is Canob Brook, which emerges out of Canob Pond and flows northwest to enter the Wood River just south of Skunk Hill Road. Based on assessments of the USGS topography map, it is determined to be unlikely that the Unnamed Stream receives ground water or overland flow from the Richmond Stump Dump, since it is up gradient about ½ mile from the site. Canob Brook is very likely to receive both ground water and over land

***Canob Brook consistently showed 4-times higher values of specific conductivity.***

flow from the site because it is directly adjacent just south of the site, and down gradient.

Canob Brook consistently showed 4 times higher values of specific conductivity than the Unnamed Stream, with an average of 981  $\mu\text{S}/\text{cm}$  vs. 251  $\mu\text{S}/\text{cm}$  respectively. Both of these readings significantly exceed values recorded at other sampling sites on the lower Wood River conducted around the same time of year, where an average of 127  $\mu\text{S}/\text{cm}$  was recorded. The slight elevation in specific conductivity in the Unnamed Stream (versus the lower Wood River figure) may be attributed to the contribution of salts and other contaminants of runoff from Interstate 95. The elevated Canob Brook data is indicative of an upstream source of dissolved particles entering the stream, most likely the Richmond Stump Dump, based on its upgradient location. Data at the Unnamed Stream, above the Stump Dump, shows significantly less influence of dissolved particles.

For the complete version of this report, including data tables and supplemental information, visit our website at [www.wpwa.org](http://www.wpwa.org).

### **Volunteers complete river survey for invasive loosestrife**

The blooms of invasive purple loosestrife (*Lythrum salicaria*) on the Pawcatuck River have come and gone, but their locations will not be forgotten.

Thanks to the eighteen volun-

teers who signed up to survey segments of the river, we now have a clear picture of the extent of the invasion in this part of our watershed.

The training session held in July,



Watershed steward Brian Allen surveys purple loosestrife by kayak.

c o - s p o n - s o r e d b y W P W A a n d U R I P l a n t S c i e n c e D e p a r t m e n t, p r e p a r e d t h e v o l u n t e e r s f o r o n - w a t e r s e a r c h a n d i d e n t i f i c a t i o n o f l o o s e s t r i f e s t a n d s. S u r v e y s w e r e c o n d u c t e d i n t h e m o n t h o f A u g u s t b y b o a t. V o l u n t e e r s p r o v i d e d d e t a i l e d m a p p i n g o f t h e a r e a s w h e r e l o o s e s t r i f e b l o o m s w e r e f o u n d. S u r v e y s w e r e d o n e o n t h e e n t i r e W o o d R i v e r, a n d o n t h e P a w c a t u c k f r o m t h e c o n f l u e n c e w i t h t h e Q u e e n R i v e r, d o w n t o t h e e s t u a r y. T h e w i l d s e g m e n t o f t h e P a w c a t u c k ( C h a r l e s ) R i v e r a b o v e t h e c o n f l u e n c e w i t h t h e Q u e e n, a n d u p t o W o r d e n s P o n d, i s b e l i e v e d t o b e l o o s e s t r i f e - f r e e a t t h i s t i m e.

The good news is that there does not appear to be any purple loosestrife on the Wood River. However, there are many isolated stands along the segments of the Pawcatuck River that were surveyed. In some areas, such as Shannock and Carolina, the stands are becoming quite dense.

The information gathered from volunteers on the location of stands will be plotted on a GIS map of the river. This will assist in developing a strategy for control of the species in the coming year.

[www.wpwa.org](http://www.wpwa.org)

## The Pawcatuck River, Discovered in 1614

By I.R.Sheldon

Reprinted from *Seaside Topics, Watch Hill Edition, August 22, 1917*

The most important reason for Westerly is the Pawcatuck River. Westerly was founded because of the river; it grew according to the dictates of the river; it still owes much if its being to the river. During the year 1915, freight, mostly coal, lumber and paving blocks, to the value of half a million dollars, was carried on the river. Although the carriers were mostly ugly box barges, towed by the faithful "Westerly," the tug that is an excursion boat on occasion, the increase in business and the savings in transportation charges have meant much to the town.

The Pawcatuck is formed by the joining of the Charles and Wood Rivers. It is about thirty miles long, and for the last nine miles forms the boundary line between Connecticut and Rhode Island. The last five miles, below the bridge in Westerly, are tidewater.

### Adrian Bloc, pioneer explorer

The river was first explored by white men when in 1614, Captain Adrian Bloc, of Block Island fame, sailed into its mouth and named it Oester Riviejen, Dutch for East River. He made the voyage in the "Restless," a boat 44.5 feet long, and 11.5 feet wide, which was built on the Hudson. The first map to show the river was sketched by the Dutch geographer, DeLaet, in 1616, from the journal of Captain Block.

Captain John Mason, with his band of warriors, on May 25, 1637, the day on which he destroyed the Pequots, crossed the

river at the ford known as Pawcatuck, by the Indians. This name came in time to mean the river, as well as the ford, to the white settlers.

The first settlements on the river were made by the Dutch fur traders at Misquamicut. When John Babcock ran away with his bride from Newport, he settled at Mastuxet, near what is now Avondale. Here the permanent settlement of Westerly was begun. The pioneers wrested their living from both land and water, and to this time their descendants take advantage of the location by combining fishing and farming.

Aside from the difficulties with the Indians and disputes with Stonington over the state boundary, no important changes affected the river until after the Revolutionary War. In 1800 the most important industry of the town was a grist mill. In 1814 Mr. Stephen Wilcox sold this to the Pawcatuck Manufacturing Co., who built the first mill for manufacturing cloth. This was the stone mill on Main Street, now occupied by the Westerly Textile Company.

### Advent of Industry

With the advent of cloth manufacture by water power, the river became of great importance. Its power was used; dams were built; towns sprang up all along its course. Westerly grew and became an important business centre. The railroad, which was begun in 1832, and Watch Hill as a summer resort, begun in about 1870, have been the other influences which have made Westerly what it is today.

The Pawcatuck River would be of little value to Westerly in its original condition. It is to the work done by the national gov-

ernment that the river owes its present importance.

According to the annual report of the Chief of Engineers to the War Department for 1916, the original useable low water depth of the river was one and a half feet, and the channel was crooked and obstructed by rocks. The tidal range is given as 2.6 feet at the mouth of the river, and 2.3 feet at Westerly.

The original project for the improvement of the river channel was obtained from Congress in 1871 by Senator E. H. Dixon. It provided for a width of 75 feet and a depth of 51 feet. This was extended in 1885 to provide for width of 100 feet, and a depth of 8 feet. Prior to 1896 the government had expended \$97,500 on the channel. The channel in use when the government began work was opened twelve years before by citizens of the town at a cost of \$4,200.

In 1896 the present project was adopted. It provides for a channel ten feet deep, with a width of 200 feet from Stonington to Avondale, 100 feet from Avondale to the lower wharves at Westerly and 40 feet wide between the upper and lower wharves.

### Work to be Done

The total estimated cost for construction will be \$ 200,361. At present, although only 74 percent completed, the channel meets all needs. The work remaining to be done is to enlarge the channel from Stonington to Avondale, and to remove the ledge at Pawcatuck Rocks. A draft of nine feet can be carried at low water. The total expenditure to June, 1916, was \$197,000, of which \$180,000 was for new work. An annual appropriation is now made for main-

**WPWA CANOE AND HIKING GUIDES**

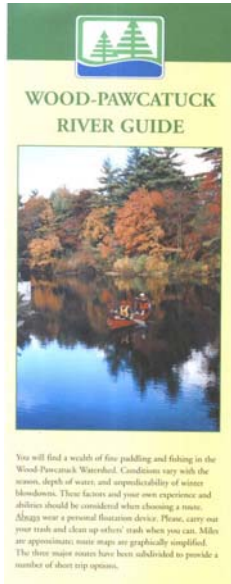
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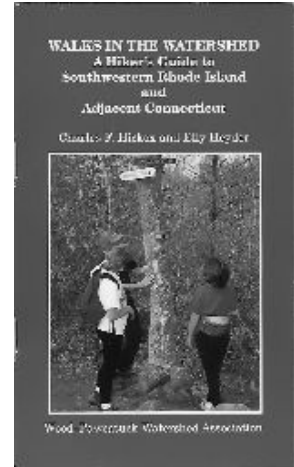


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Island allows the harvesting of shellfish only from the outer waters of Little Narragansett Bay. Harvesting is prohibited in the inner portion of Little Narragansett Bay, including all of Watch Hill Cove. Connecticut prohibits the harvesting of shellfish in sections of the Pawcatuck River and allows only restricted shellfish relays in other areas of the Pawcatuck River and Little Narragansett Bay.

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tenance, and there was a balance on hand for the past year of \$2,011.

The men who petitioned the government in 1871 were: W.A. Burdick, S.R. Segar, Samm Cross, Chas. Maxson & Co., Cottrell and Babcock, Stillman and Clark, Battersson and Ledward, Thomas Segar, Capt. Joshua Thompson, Moss and Babcock, Stillman Brothers, and

D.R. Wheeler.

In their petition they estimated that it was costing them \$13,000 a year to have their goods transhipped to and from Stonington. At this time seventeen sailing and two steam vessels, were trading on the river. They had a total tonnage of 480 tons. "Florence," steam tug; "Belle" schooner; "Josephine," schooner; "White Wing," steam boat; "E.A. Stevens," schooner; "Maria," schooner; "T. Dickens," schooner; "A Crandall," schooner; "Susan E. Nash," schooner; "E.W. Babcock," schooner; "E.A. Chesbro," schooner; "Lucy A. Hall," schooner; "Harriet," schooner; "Jennie," sloop; "Ida May," sloop; "Pettaquamscutt," sloop; "Madgie," sloop; "C.H. Smithers," sloop; "Glide," sloop; "G.B. McClellan," sloop.

**Transshipped at Stonington**

During that year, 1871, the freight

exported by water was: Cotton, 1023 tons; \$2,447,000 machinery; 550 tons building material; 4500 tons granite.

The freight received by water was 18,150 tons, \$887,500; total \$3,334,500. Tons, 19,675; feet, 8,500,000; bales, 23,986; total \$3,763,428. Practically all of this was transshipped at Stonington.

At present it seems that the river is fully developed commercially. The Town of Westerly is now failing utterly to get any value out of its beauty. Great numbers of visitors exclaim over "our wonderful little park," while very few ever know of the beautiful stretch of water between Westerly and Watch Hill. If Westerly could lay plans now to develop this shoreline, a great step would be taken towards increasing the future prosperity and happiness of the people.

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**Wood-Pawcatuck Watershed Association**



Engineers Jim MacBroom and Jeanine Bonin conduct a dam inspection of Horseshoe Falls as part of the Shannock Fish Passage Feasibility study.

Opinions expressed in *Watershed* are not necessarily those of WPWA, its Board of Trustees, or staff.

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