

# WATERSHED

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A Newsletter of the Wood-Pawcatuck Watershed Association

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## Atlantic Salmon in the Wood-Pawcatuck Watershed – Fact or Fantasy?

Dr. Saul Saila

The Atlantic salmon has been the object of management and restoration plans in our watershed area for about 25 years. As stated in the Plan for Restoration of the Atlantic salmon to the Pawcatuck River, published in 2000 by the RI Department of Environmental Management Division of Fish and Wildlife (RIFW), the overall goal is “to reestablish a self-sustaining population of Atlantic salmon in the Pawcatuck River watershed for maximum public benefit including fishing.” The interim goal is to “produce the number of returning adult salmon that will exceed the brood stock holding capacity of RIFW hatcheries and provide some level of reproduction in the wild.”

What is the logic and feasibility of these goals? To start, how certain is it that a “self-sustaining” population of Atlantic salmon ever existed at all

in the Pawcatuck River watershed? Colonial accounts are not sufficiently reliable to answer this question.

Atlantic salmon and brown trout were first described by Linneaus in 1758 as a valid species more than a century after colonization of Rhode Island. Brook trout (*S. fontinalis*) were first described as a distinct species by Mitchill in 1814, more than a half century later than the Atlantic salmon and brown trout. Prior to the common use of these species designations, the word salmon could have been assigned to Atlantic salmon, brook trout and possibly other species by early settlers in this region. It should be recalled that sea run (salter) brook trout, which have access to and utilize the shallow coastal sea or estuaries to feed for various periods of time, may reach weights to fifteen pounds. Furthermore, the flesh of virtually all salmonid fishes feeding on natural diets is reddish or pink in color. It follows that the word “salmon” as used

by the early colonists could have referred to either salter brook trout or Atlantic salmon in our watershed area.

Because the Wood and Pawcatuck Rivers are primarily low gradient streams, it seems more likely that the so-called salmon were sea run brook trout, not Atlantic salmon, which prefer higher gradient streams as well as higher latitudes. Although it is possible that a small number of Atlantic salmon may have occasionally strayed into the Pawcatuck River, the low gradient of this river (which hasn't changed since colonization) indicates that it is not a suitable habitat for the sustained natural reproduction of this prized fish.

An authoritative report on the geographic distribution of Atlantic salmon provided by Scott and Crossman (1973) indicates that the Atlantic salmon inhabit the North Atlantic Basin from Greenland to the Connecticut River in New England. It is evident that our watershed is at the extreme southern limit

*(Cont'd Page 6)*

**Lattner Foundation challenges Westerly and Stonington donors**

Trustees of the Forrest C. Lattner Foundation awarded a \$10,000 challenge grant to WPWA this past December. This gift follows a history of support from the foundation over the past decade, most recently in the areas of water quality monitoring and small stream study as described elsewhere in this issue.

Some of the foundation trustees reside along the lower Pawcatuck river in the Westerly and Stonington areas. Because of their personal connec-

tions with the local environment, it is easy to conclude that their interest in the success of WPWA is at least in part tied to their desire to protect the river and natural resources they share with others in this region.

Though their gift was not tightly restricted, the trustees did present the gift as a challenge grant, in hopes that their gift will leverage additional funds from donors. Foundation trustee Doug Hollenbeck expressed particular interest in trying to inspire other residents from the lower Pawcatuck region to increase their support

of WPWA, and to become members and supporters if they have not yet joined the cause.

The Lattner Foundation's support of our local environment does not stop with WPWA. The foundation has supported other local groups such as the Westerly Land Trust, and nationally groups such as American Rivers.

The support of the Lattner Foundation means a lot to WPWA operations. Please respond to this challenge by following their lead and increasing your giving to WPWA and the local environment.

**Streams** *(cont'd from page 5)*

small watersheds and tend to be fed by groundwater. This means that they could be sensitive to ground water withdrawals. Since there is a low volume in the streams, during the summer months the flow in these streams drops dramatically. Any withdrawals causing water to be diverted from the stream flow into a pumped well at this time of year could drop flow below levels needed to sustain aquatic organisms. Low flows can also raise water temperatures beyond the tolerance of organisms such as brook trout.

Often these streams are less than 10 feet in width. Under

state wetland regulations, they are provided with only 100 foot river bank protection as a buffer area. Streams wider than 10



Andrea Guillot and Danielle Aube sample macroinvertebrates in North Stonington.

feet acquire a 200 foot protected buffer zone. Activities that reduce or eliminate river bank vegetation leaves streams susceptible to runoff from nearby roads or developments that could

carry nutrients, toxic products such as oil and grease, and sand. Sand fills in around gravel in the stream beds, reducing available spawning grounds for fish, and posing a smothering hazard for insects and clams. Nutrients can cause algal growth and reduce avail-

able oxygen. Pollutants can be carried into receiving rivers and ponds, adding to their problems.

This year WPWA will focus on increasing the number of sites monitored for temperature and macroinvertebrates. WPWA has proposed a study of habitat characteristics of sea run, or salter, brook trout in southeastern MA streams where anadromous runs exist, to compare with study results in Wood Pawcatuck watershed streams.

Many of these studies have been made possible by grants from the Lattner Foundation, the Community Foundation of SECT, John Wald Science Grants (administered by RINHS), and the RI General Assembly.

## **WPWA proposes comparative study of sea run trout habitat in southeastern MA**

WPWA has asked the support of Trout Unlimited's Embrace-A-Stream program to fund a study of habitat and physiological requirements related to restoration of anadromous brook trout populations in streams. The proposal calls for a comparative study of habitat conditions in Red Brook stream, and other streams in southeastern Massachusetts that support anadromous trout runs.

Three seasonal studies of brook trout habitat parameters and physiological requirements have been conducted by WPWA in our watershed. So far two reports have been published that describe in more detail the requirements of the species locally. Based on this research, principal investigator Dr. Saila suggests that the anadromous brook trout is more suitable for restoration than the Atlantic salmon in the Pawcatuck watershed.

WPWA has proposed a careful assessment of habitat and physiological requirements for these fish by studying habitats that contain sustainable stocks of sea run brook trout. Because no RI streams appear to contain sustained runs, streams in nearby Massachusetts, including the Red Brook stream on Cape Cod, will be studied and compared to streams in our watershed.

The goal of this applied research project is to more effectively define the physiological

and habitat requirements of various life history stages of anadromous brook trout, and potential limiting factors, using the Red Brook and other streams for comparison.

The most intensive work will be done on Red Brook stream, a manageably sized stream that contains a sustained population of sea run brook trout. Red Brook is under the stewardship of Trout Unlimited and the MA Division of Fish and Wildlife, making it highly suitable for the implementation of the study.

Part of the study will employ the use of newly-developed microtags in captured brook trout in Redbrook Stream. Returning trout will be recaptured in hope of recovering one or more tagged fish to trace their journeys through the watershed and estuary.

For additional comparisons, WPWA will also assess conditions at Angeline Brook, Mashpee River, Sautuit River, Marston's Mills River, Quashnet River, and Scorton Creek. These tentative sites have been identified based on published studies of Keefe and Wynne (1991) and Mullan (1958). Further development of sites may result from discussions from TU and MA F&W.

This project will involve the cooperative efforts of TU and WPWA, as well as the support of the MA F&W, RI Department of Environmental Management, and the University of Rhode Island. Field work will include stream measurements and moni-

toring; fish trapping, tagging, and recovery; public education and outreach; data management and analysis; and reporting.

The results of this study will be published and distributed, contributing to a better understanding of the behavior and movements of sea run brook trout in estuaries, and the physiological and habitat requirements for a successful sustained sea run population of brook trout.

The ultimate goal of the study is to contribute to the restoration of the sea run brook trout population by better understanding its estuarine behavior, and better knowledge of the existing sustainable habitat conditions. The immediate goal is to derive information from the Red Brook and other streams with sustainable sea run brook trout populations to relate to the potential for restoration of the species in the Wood-Pawcatuck watershed. From the study, WPWA hopes to determine whether it is feasible, and if so, where it is feasible, to do a systematic restoration activity. In other words, are there any places where it can be done, and what has to be done to do it?

The study also hopes to address the least understood aspect of the sea run brook trout life history- their behavior in salt water. Recovery of tagged fish will provide us new information regarding the behavior of these fish in estuaries.



## From the Executive Director

### *New rules provide timely notice to watershed councils*

Currently in draft are RI Rivers Council Rules of Notice, which allows for notice of proposed action to watershed councils by specified state and local agencies. The rule implements Section 42-28-8 of the *General Laws of Rhode Island*, as amended, providing for notice to watershed councils from state and city or town agencies regarding projects, developments and activities within the watershed.

This is welcome news to watershed councils such as WPWA that often hear about proposal too late to prepare timely comments, appear at public hearings, or weigh in with suggestions for change. Advance notice will also allow watershed councils to reach out to members and constituents to get involved at the local planning level.

The rule stipulates that the watershed council must first select from the agencies listed in the rules, then write a letter of request to have specific types of notice sent to the watershed council.

Once determined, management of notice received will be in order. Management of notice will be a new venture for us, since it is easy to imagine the volume of notice that could potentially be received by WPWA, whose watershed has portions of ten RI towns, in addition to the

state agencies included in the rule.

The good news is that WPWA will be made aware of development master plan hearings, RIDES permit applications and large-scale ISDS applications, changes to zoning ordinances, and other local proposals that impact our watershed.

WPWA staff and trustees participated in the review of draft rules, making suggestions for strengthening the rules and for the provision of all documents of interest from the various agencies in state and local government.

### *Champlin Foundations to feature WPWA in annual report*

For their 2004 annual report, the Champlin Foundations have chosen WPWA as their featured project. The cover of the report will picture the WPWA campus, and inside an article will discuss the history of Champlin Foundations in the establishment of our river-front headquarters, conference and learning center, and public fishing access.

We are so grateful to Champlin Foundations not only for their support in achieving our goals, but for the recognition this feature will give our organization—a “stamp of approval” if you will—from one of our state’s most highly-regarded benefactors.

Best wishes,



## Public opposition thwarts Charlestown ATV park

The application for development of an off-road vehicle park adjacent to the Ninigret National Wildlife Refuge has been withdrawn.

In a letter to the Charlestown Zoning Board of Appeals, the applicants attorney states the reasons for withdrawal of the application, including the amount of opposition which surfaced against the project, and the “number of issues raised, in particular by the Fish and Wildlife Service....”.

Charlie Vandemoer, refuge manager at RI National Wildlife Refuge Complex, thanked those whose hard work and support in mounting opposition to this project thwarted what, in his opinion, was “one of the most serious threats to the Ninigret National Wildlife Refuge in decades.

WPWA thanks board member Bob Schiedler for his participation at meetings and his fine representation of WPWA in this matter.

### **RI Natural History Survey 10th Annual Conference**

### ***“Rhode Island’s Forests”***

Friday, March 4, 2005

8:00am—4:30pm

Rhodes-on-the-Pawtuxet  
Cranston, RI

Keynote speaker:

Dr. Louis Iverson,

Landscape Ecologist, USDA

To register, call 401-874-5800 or email  
kstillwell@rinhs.org

## **Integrated studies demonstrate need for adequate stream flows**

Denise J. Poyer

Over the past five years, WPWA has embarked on a series of monitoring and research projects, employing an integrated study of fish assemblages, stream temperatures, benthic macroinvertebrate and nutrient sampling, and a study of small dams, to provide data to support protection of minimum stream flows and small stream habitat in watershed streams.

The studies, under the guidance of Dr. Saul Saila, are designed to establish baseline data and identify optimum habitat. We have looked at fish communities and the physical habitat parameters associated with those communities. We have also started collecting information on aquatic insects and other small organisms that need cold water and high oxygen levels. We have measured dams on these small streams, often very small dams themselves, to determine the obstacles and impacts they introduce to the streams. The in-stream temperature study has led to a program developed by Dr. Saila that can predict water temperature based on air temperature.

Some of WPWA's main concerns for small streams are 1) Minimum Stream Flow - making sure there is enough water to support or restore native organisms and plants in the appropriate habitats.

2) Temperature - looking at activities that could result in higher temperatures in the stream. 3) Sedimentation - preventing excess removal of natural vegetation along the stream buffer and/or minimizing new impervious surfaces in the stream watersheds. 4) Nutrient loading - while this is more of a concern for receiving water bodies, excess nutrients may lower oxygen levels in slow moving small streams as well. 5) Introduction of pollutants - usually from roads and other nearby impervious surfaces, storm drains, or illegal dumping.

WPWA has become concerned about issues that could be affecting the health of these streams. Our projects have been designed to look at aspects of small streams that are not commonly studied by state or federal agencies.

Small streams, sometimes called low order streams, refer to those inconspicuous brooks and streams that run throughout the Pawcatuck Watershed. "Low order" means the stream has no other tributaries, or only very small ones, joining them. Examples are Fisherville Brook, Sherman Brook, and Locke Brook in Exeter; Roaring Brook, Paris Brook, and Breakheart Brook in West Greenwich; and Beaver River and Meadow Brook in Richmond.

Small streams provide significant habitat for wildlife in the Pawcatuck Watershed. They are

the primary spawning grounds for brook trout, the only native salmonid in our waters. Song birds are attracted by numerous insects hatching from the water and larger raptors feed on fish and small mammals. Wading birds such as herons feed on frogs and turtles.

Physically, these streams are more sinuous, and have a variety of channel features, such as riffles, runs, and pools. The riffles are shallow rocky areas, or white water, that incorporate oxygen into the water through splashing action. Riffles also provide habitat for many important macroinvertebrates that feed on detritus in the water and become food resources for fish and amphibians. The pools provide cool, deeper water for fish to hide or ride out warm summer spells.

Most of these streams tend to be groundwater fed, which keeps the water temperatures cooler than larger rivers, again providing places for cold water fishes to survive.

Vegetation from the banks of small streams falling into the streams provide food resources for organisms in larger river channels. These babbling brooks also provide watershed residents and visitors with a great deal of beauty and aesthetic pleasures.

The small size of these streams leaves them more susceptible to impacts from development and other pressures.

Low order streams have

*(cont'd on page 2)*

**Atlantic Salmon** (*Cont. from Pg 1*)

for this species. Most scientists acknowledge that global warming is occurring, and that temperatures have risen in the recent past. Indeed, a recent analysis by Wood Pawcatuck Watershed personnel of temperature records from the University of Rhode Island weather station in Kingston indicates a temperature rise of about 2.5 degrees during the past 46 years. This increase translates to almost similar rises

in river water temperatures. These analyses suggest that a significant reduction of suitable Atlantic salmon habitat has recently occurred due to increasing temperatures in this area which were already marginal prior to the increase.

It is interesting to note, too, that the official seal of the town of Westerly depicts three salmon – presumably Atlantic salmon. However, it should be recalled that Westerly's fish seal was designed by Lambert Gunther and was officially designated as the Westerly seal on October 8, 1945 – a considerable time after Westerly's charter, which was granted in 1669.

Although the word "Misquamicut" is recognized as an Indian word for red fish, the reddish fish flesh could have been provided by either brook trout or Atlantic salmon. The

continuing presence of brook trout in our watershed and the low gradient of major streams in the watershed favors brook trout as the primary source of the word "salmon" by early colonists. Although several books and records refer to salmon in Rhode Island during the 17<sup>th</sup> and

*The very highest  
(rate of) return of adult  
Atlantic salmon ...  
reported in the RIFW  
Strategic Plan ... was  
about four one  
hundredths of one  
percent!*

18<sup>th</sup> centuries, only a report by Nixon and Oviatt (2000) contains a statement referring to the leaping properties of fish at a natural falls in the Blackstone River. The fish, attempting to leap over the falls, were probably Atlantic salmon, because brook trout do not attempt to jump over obstacles in flowing water.

The very highest returns of adult Atlantic salmon from stocked hatchery parr and/or smolts reported in the RIFW Strategic Plan were 38 fish in 1982 and 1984 from a stocking of more than 100,000 parr in each case. This translates to a best return of about four one hundredths of 1%! Although this is a very low number by any standard, the 10 year average after 1984 was only 3.5 adults per year – an even lower figure. From this information it is clear that efforts to date have produced no acceptable returns and that a careful study of the overall habitat requirements of the various life history stages of the Atlantic salmon should be made prior to

further haphazard stocking of any life history stage. A brief summary of some of the Atlantic salmon habitat requirements for various life history stages follows.

Returning adult Atlantic salmon may stay in fresh water from one month to one year before spawning. During upstream migration adults cease feeding and alternate periods of active swimming with stationary periods (up to two months) in a given pool. The quantity and quality of holding pools is an important factor influencing upstream migration. Spawning takes place in a variety of environments and is usually characterized by moderate (0.2-1.0%) thalweg (deep, midstream flow) gradients. The spawning bed substrate is made up of a small proportion of sand and a large proportion of coarse materials ranging from gravel to cobble. Hydraulic factors characterizing spawning areas include water velocities of 40-50 cm per second and water depths of 20-30 cm. Even these simple requirements severely restrict the area suitable for successful reproduction. The likelihood of adequate substrate habitat for successful adult upstream movements into suitable spawning areas seems very low in the Pawcatuck River, based on available information. These requirements should be carefully evaluated prior to making statements promising successful natural reproduction in our watershed area.

There are also specific habitat  
(*cont'd next page*)

**WPWA CANOE AND HIKING GUIDES**

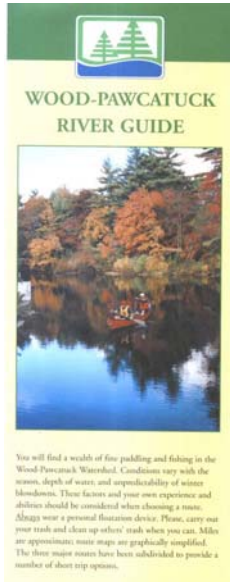
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By Charlie Hickox and Elly Heyder

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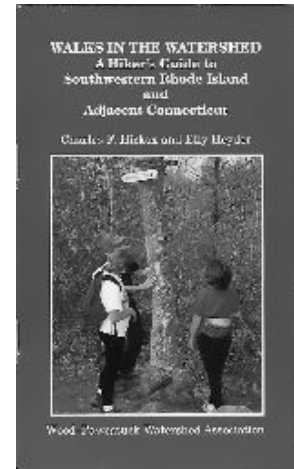
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**Atlantic Salmon (from page 6)**

requirements for the non-migratory and early freshwater stages in the watershed area. During summer base flows desirable habitat features include water temperatures between 16-19 degrees centigrade, oxygen saturation exceeding 60%, and pH values between 5.5 and 6.8. Acceptable water velocities include 10-47 cm per second for parr and depths of 20-57 cm for parr as well.

In summary, it is suggested that the stated goals of the Strategic Plan for Atlantic salmon restoration are unrealistic. Results of current Atlantic salmon restoration activities have been a failure for 25 years. A far better understanding of the habi-

tat requirements of all relevant life history stages should be achieved prior to further stocking of any life history stage of this species. Indeed, there is some reason to believe at this stage of our knowledge that Atlantic salmon runs existed prior to and during early colonization are not convincing. The physical properties of the Pawcatuck watershed area are such that sustainable natural populations of Atlantic salmon probably never existed in this watershed. The present evidence suggests that primarily sea run trout (either salter brook trout or brown trout) present an opportunity which seems substantially more likely to succeed in the long run than

the current Atlantic salmon restoration plan, if free passage to and from the sea is established.

RI Rivers Council, RI Land Trust Council, and RI Assoc. of Conservation Commissions present...

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**Wood-Pawcatuck Watershed Association**



Winter settles along Fisherville Brook in Exeter

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