

# WATERSHED

A Newsletter of the Wood-Pawcatuck Watershed Association

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## Ground Water and Surface Water—What is the Difference? by Tom Boving, URI, WPWA Board

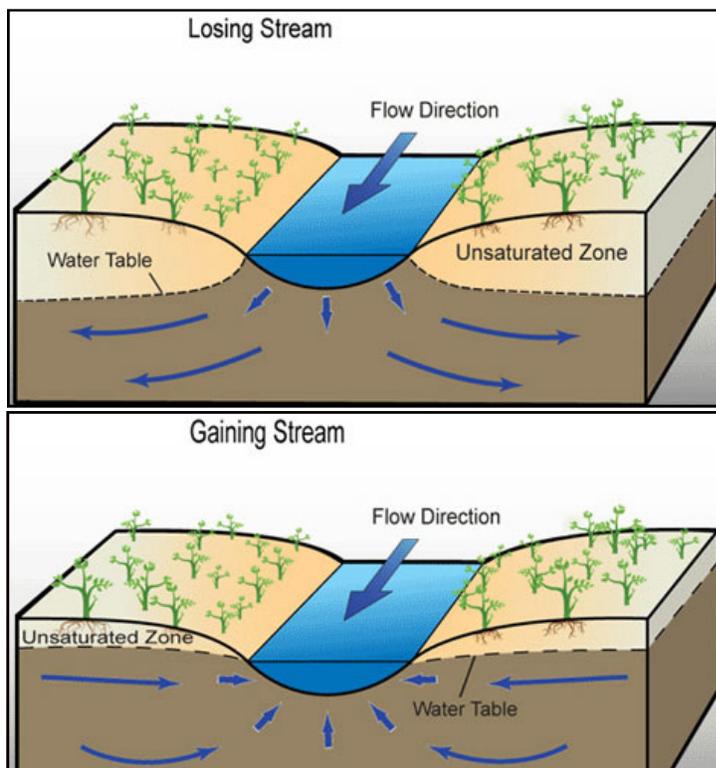
For many people, water below the surface - appropriately called ground water - and water in rivers or lakes (aka surface water) seem to be two different and unconnected things. While this is not the case at all, people cannot be blamed for separating these two important water sources because even laws often treat them as if they are not connected. However, to protect and preserve the water quality and quantity in a watershed, one must understand that surface and ground water are closely connected. Indeed, it would be hard to imagine how a thriving ecosystem, like the Wood-Pawcatuck watershed, could function without contributions from both water sources. Let's explore what the issues with ground and surface water are and why we cannot treat them separately.

The word *hydro* has its roots in the Greek language and actually means water. The folks who study water are therefore known as hydrologists. Probably the earliest hydrologists were the ancient Egyptians who, by nature of living in a desert climate, needed reliable water supplies for farming and sustaining their culture. This is told in the Bible, chapter 7 phrase 24 in Exodus, "all the Egyptians had to dig in the neighborhood of the river for drinking water, since they could not drink the river water." The Egyptians figured out that by digging wells near the Nile River, they were able to collect clean water year-round. This is because the river water infiltrates into the ground and becomes ground water, recharging the wells near the river. On its way to the well, the surface water, which even back then was heavily polluted, was purified by natural treatment processes. In other words, the Egyptians took advantage of water being connected to sources on the surface and below ground.



The Egyptian symbol for "water".

An example of a stream losing water/contributing to ground water because of over pumping and groundwater contributing to a stream. (drawings courtesy of [www.ga.gov.au](http://www.ga.gov.au))



Surface water can be found in streams, ponds, marshes, lakes or other fresh (not salty) sources. Man-made dams and the reservoirs they create are other important storage areas for surface water. In fact here in Rhode Island, the Scituate Reservoir, built in the 1920's, is the largest inland body of freshwater in the state and most of the state's citizens get their drinking water from it. The Scituate Reservoir is fed by precipitation and rivers. After storms, those rivers channel surface runoff to the reservoir, but these rivers are also fed by the inflow of ground water. Hydrologists call this ground water contribution to a river "baseflow". That baseflow is the reason why our rivers do not dry out when the stormwater runoff eventually dries up shortly after a storm.

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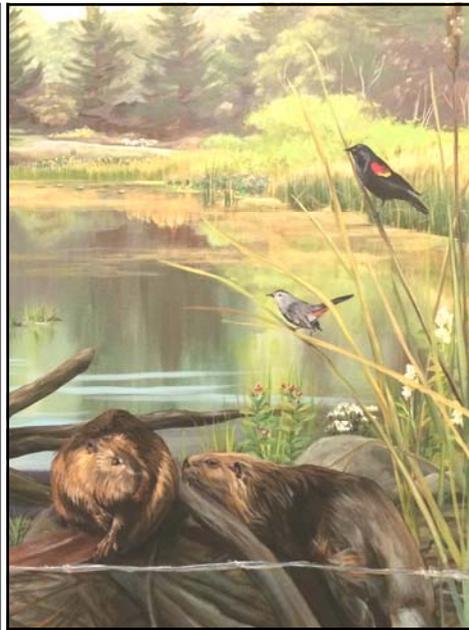
## From the Executive Director

With winter rapidly approaching, it's time to get out there and make the most of all the recreation the watershed provides us in the Fall. Enjoy all the outstanding birding, leaf peeping, paddling, fishing, and hiking that the watershed offers.

But the fun doesn't end when the snow starts to fly! I'm looking forward to hiking, snowshoeing, cross country skiing, tracking, and hopefully a little ice skating during the cold winter months.

Even if cold weather isn't your cup of tea, I hope you're planning to stay active outside this winter. Children especially need to maintain that special connection with nature throughout the winter. We'll be working hard this winter to line up a full schedule of outdoor events for your family in 2015.

I urge you to please consider giving extra generously to our Fund Drive. This year the laboratory costs to analyze water samples from our water quality monitoring program have risen by thousands of dollars to a total cost of over \$10,000. Keep a sharp eye on your mailbox for our mailer and please give generously toward this tax-deductible giving program.



## Welcome Center Peek

We're very excited to give you a sneak peek at a very special mural that will be forever showcased in our Welcome Center! Artist Christine McIntyre-Hannon generously donated many hours of her time to complete an amazing realistic representation of the flora and fauna that inhabit the Wood River and Frying Pan Pond. We thank Christine for her incredible level of attention to detail so we can educate our visitors about the species they can see along and within the river. More of Christine's work can be viewed at [www.hannonartworks.com](http://www.hannonartworks.com).

The hydrologic cycle interconnects surface and ground water. Ground water forms when infiltrating rain or surface water percolates through the soil until it reaches the water table. The geologic structure in which the water collects and travels underground is called an aquifer. About 40% of Rhode Island's residents – particularly in the state's southern part – rely on ground water from wells drilled into these aquifers. When more water is pumped from the wells than infiltrates from the surface, the water table in the aquifer drops. This is similar to a bath top in which more water is drained than supplied from the faucet. Because surface water and ground water are connected, over-pumping an aquifer can cause the water level in a river to drop, too. Similarly, taking too much water from a river not only lowers the flow of water in the river but can also cause ground water levels to drop.

In the worst case, over-pumping can result in a river drying out or nearby wells to fall dry. Therefore it is important to understand how much water can safely be pumped from an aquifer or river. In other words, finding a balance between how much water enters the system and how much can be taken out safely is the biggest challenge for our water resources managers.

On a final note, because aquifers are covered by a layer of soil or sometimes rock, ground water is less easily contaminated than surface water. But the soil cover above the aquifer cannot fully protect the ground water from pollution. If, for example, heating oil leaks from an underground storage tank, it will eventually reach and pollute the ground water. When that happens, cleaning up the polluted aquifer is costly and time consuming. Ignoring the problem will likely result in polluting other wells down-gradient from the leaking tank or contaminating ground water that may eventually end up discharging into a river or lake. No matter how we look at it, water is a very dynamic part of our environment and there is a strong connection between water at the surface and below the ground.



**Let's Go Treasure Hunting! (aka Geocaching)** by *Jim Cole, WPWA Volunteer*

Have you ever read Treasure Island or other tales of buried treasures? Most children and many adults have dreamt about finding a buried treasure at some point. Over the years many people have actually carefully hidden items which could be retrieved at a later date. Yes, there are some real treasures out there!

Today there is a new type of treasure hunt. It is called Geocaching. Geocaching is a modern-day treasure hunt using a GPS-enabled device. Most so-called "smart phones" these days include GPS technology. You can also buy a variety of GPS devices for finding your way when traveling by car or for use when hiking in the wilderness. These also be used to take part in a Geocache treasure hunt if you don't have a smart phone.

Official Geocaching started on May 3, 2000 with the first cache being placed near Beaver Creek, Oregon. On September 2, 2000 the Geocaching.com website became active with 75 known caches. As of September 2014 there were more than 2,490,670 Geocaches, located on all seven continents and many islands

worldwide. There are more than 6 million registered Geocachers searching for these caches!

*The cache located closest to the WPWA campus. WPWA staff tried out Geocaching for the first time and were able to find it easily with an iPhone and the app. Come and find it!*



It is easy to get started. All you need to do is sign up for a Free Basic Membership and download the Geocaching application (app) to your smart phone. There are apps for Androids, iPhones, and Windows phones. The app will take you through the quick and easy registration process. If you have a GPS device other than a phone, you will need to go to [www.Geocaching.com](http://www.Geocaching.com) to register. You will want to read the rules of the game that every Geocacher must follow. Be sure you understand these rules before you start your first seek.

Once you've downloaded the app, registered, and read the rules, you are ready to begin your first treasure hunt! You can visit the "Hide and Seek a Cache" page on the website or start the app on your smart phone. You will be asked to enter a zip code or other location details and given a list of caches located in the selected area. Pick a cache and the hunt begins! For phones, the app will point the way to the cache, providing you an approximate distance as well, and you are on your way. For other GPS devices you need to enter the coordinates of the cache so your GPS can point the way.



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Once you find the cache there are several things you need to do. First, sign the logbook to let others know that you found it. Look over the items in the cache. The rules explain the different types of items in the cache and what you can and can't do. When you are done, return the cache to its original location making sure it is out of sight. You should then share your adventure with others by entering details of your find. Again that can be done on your phone or by going to the website.

Now you know the basics of Geocaching, however, this is only the beginning! Once you are familiar with how everything works, you will want to hide your own caches. This can be a tricky process since all caches must be registered. The most important parts after finding a good location are to do some research, get permission from the land owner, and follow the rules of what you can put in the cache. The information will be verified by Geocaching.com before a cache is activated and listed on their website.

What do you put in the cache? A full list of prohibited items can be found on the webpage. For example, no food of any type is allowed and you can't dig a hole to bury a cache or place any harmful items in it.

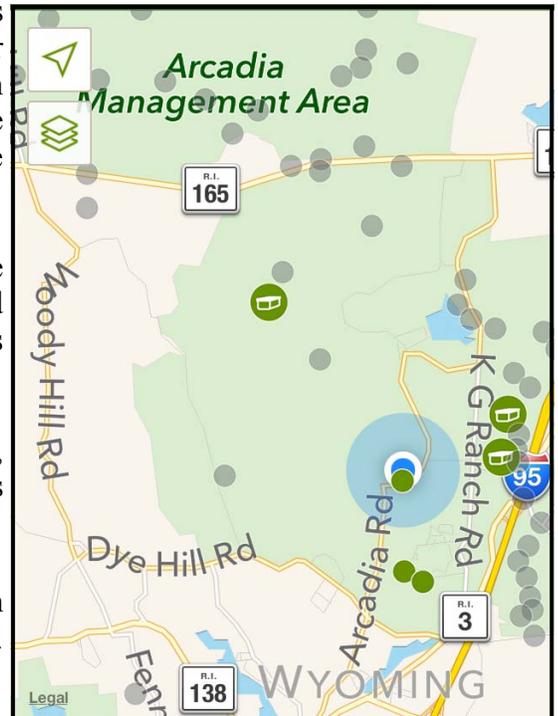
So you want to take the children for a walk in the woods? Well, why not add a treasure hunt to make it even more fun? After all, it's an adventure that the whole family can share.

WPWA is planning an indoor/outdoor Intro to Geocaching program for those interested in getting started and meeting other Geocachers. Learn the basics and get out to find and place some caches!

\*\*November 16, 2014 from 1:00 pm-3:30 pm

\*\*December 28, 2014 from 1:00 pm-3:30 pm

\$10/\$15 WPWA Member/Family & \$15/\$25 Non-Member/Family



A map of caches (green & gray dots) located near the Hope Valley WPWA Campus (blue/white dot).

## The Work Keeps Flooding In by Chris Fox

All of the Pawcatuck watershed communities impacted by the 2010 flood and Hurricane Sandy will benefit from a \$720,000 grant awarded to WPWA by the US Department of the Interior's Sandy Relief program. With this funding WPWA will conduct an intense two year planning project that will culminate in the creation of a management plan for the entire Pawcatuck Watershed. The plan will help the watershed communities prepare for climate change and mitigate the impacts of future severe storms. As well as protect and enhance fish and wildlife species and habitats and improve the economic viability of the watershed communities.

The *Pawcatuck River Watershed Flood & Storm Damage Resiliency Management Plan* will identify opportunities to protect and enhance natural resources with a focus on reducing vulnerability to future storms. This plan will identify specific locations within the watershed where existing flooding intersects with opportunities for restoration, protection or enhancement. The plan will identify structures such as culverts, bridges and dams that create flood problems and recommend remedies that also enhance or restore natural systems.

As was the case with our recently completed Pawcatuck fish passage projects, achieving our Sandy Grant goals will be no small task. It will require intense participation by all the Towns, various departments within the states of RI and CT, several federal agencies, and local conservation organizations. In the face of climate change-induced increases in the intensity and frequency of extreme storms, WPWA's management plan will provide a flood resiliency road map for the watershed communities. This map will help avoid, correct and eliminate future storm damage impacts by restoring, enhancing and preserving those areas that are most vulnerable.

## **Adapting the Watershed: A WPWA Summer Lecture Series** *by Helen Drew, WPWA Board*

Experts presented a series of lectures over the summer to inform residents in the Wood-Pawcatuck watershed (1/3rd of all of RI) how climate change impacts will manifest themselves in our communities and how we can prepare for and adapt to these changes. The lectures build from the fact that climate change is happening. The challenge before us is how do we adapt now to minimize the adverse effects of climate change and, in some cases, predispose ourselves to take advantage of the positive effects.

WPWA, with support from the URI Coastal Institute, sponsored presentations and discussions to: (1) provide the best available science on how climate change will affect rainfall, flooding, and the ecology of the watershed, and (2) explain what every resident can do now to prepare for these changes in order to ensure our safety and economic vitality. The tone of the series was not doom and gloom; it was built upon scientific data and the practical and pragmatic changes we can make in our communities that will allow us to adapt to climate change effects as they present themselves.

The presentations: “Storms and Floods” presented by David Vallee, NOAA and Michelle Burnett, RIEMA; “Water- Will There Be Enough?” presented by Tom Boving, URI and Alyson McCann, URI; and “Plants and Animals- How Will They Change Throughout the Watershed?” presented by Gary Casabona, NRCS and Peter August, URI are posted on WPWA’s website ([www.wpwa.org](http://www.wpwa.org)). From our distinguished speakers, we learned many lessons:

Fact: Rainfall will become unpredictable.

Lesson: We need to be very conscientious of our use of water and conserve it as much as possible.



*The presenters from the first lecture, Michelle Burnett (RIEMA) and David Vallee (NOAA) explained how climate change could impact future storms and flooding in our local watershed.*

Fact: More intense rain events will be more common and will cause more flooding of our streets, basements, and neighborhoods.

Lesson: We need to be mindful of stormwater runoff in our communities and do everything possible to minimize impervious surfaces. Also, we need to slow the flow of runoff from our streets to our streams through protection of vegetated stream banks (riparian areas). We need to prepare ourselves and our families for these events.

Fact: Our seasons will change with an earlier spring, a warmer summer, and a shorter winter.

Lesson: Careful selection of landscaping plants can provide food resources for pollinator species for extended seasons.

Fact: Our fauna and flora will change as the RI climate becomes more like a mid-Atlantic climate.

Lesson: Protection of open space is more important than ever. Protected lands assure there will be a safe haven for southern biota moving north. Protected lands also conserve groundwater, ensure healthy riparian buffer strips, and minimize the amount of impervious surface in our watersheds.

What’s next? WPWA will continue to address the potential impacts of climate change in the watershed and encourage all residents, organizations, and municipalities to attend to preserving the quality of the watershed given the coming storms, floods, invasive species, and development.

## Another Successful Season of Land & Water Fun by Denise Poyer

*A group of students visiting from China experiencing new flora and fauna on the Wood River.*

The darkness was just starting to deepen when we first saw small flashes of light in the water. The flickering was so faint at first that we were not sure if we were imagining it. Then someone called out, "I see one!" and other paddlers started to echo that observation. A few minutes later, every paddle stroke seemed to cause a cascade of lights tumbling through the inky pond. The luminescent comb jellies were putting on a show right here, in Ninigret Pond. Our annual Row and Glow Paddle, held in late August with the Salt Ponds Coalition, was the most popular WPWA event of the year. Since the event filled up so quickly and we had a large number of inquiries about this program, we added a second night. However, even that was not enough to include all those who wanted to

chest Point National Wildlife Refuge in Middletown. Sadly for us, and the participants who loved our guide's knowledge and mannerism, Roger has moved on to a new position at Austin State University in Texas.

Once again, the Fly Tying classes in April were a big hit. Jay Boyer, an avid fly tyer and fisherman and prolific WPWA volunteer, had the young and the not so young join him to learn to tie their own flies for fly fishing. From an educational perspective, this skill also helps you understand the special ecology of the river and the relationship of fish to their favorite prey. Every fly fisherman needs to know which flies, or aquatic insects, are hatching so they can choose the right one to attract a trout.



white water run for kayakers. The summer also treated us to three super full moons in a row in July, August, and September. Over the course of three evening paddles (timed so paddlers could watch the moon rise as they made their way back to the dock after sunset), thirty-five people took advantage of the glowing night sky.

Our last outdoor program of the season was a unique combination of paddle and foot. We joined eco-

*Photo by Elise Torello*



experience this amazing natural phenomenon. We will increase the event to five nights for the summer of 2015!

Even with the lack of rain, WPWA had another successful year of recreational programs. We began the year with a popular series of five winter and spring bird walks led by Roger Masse. Twenty-five participants took part in one or more of the walks with over 100 different species of birds spotted. Among the highlights were the sightings of a snowy owl and a barn owl at Sa-

Our other land-based program was the our two-day Map and Compass course, taught in conjunction with the local AMC chapter. Participants learned to navigate safely in the woods using compass bearings, both in the classroom and out in the field.

In June we paddled the upper Pawcatuck River to tour the three recently completed fish passage projects. Paddlers discovered first hand that one recreational benefit of the new rock ramp at the Kenyon Industries dam is an interesting

logical forces with the Audubon Society of RI for a paddle/hike in the Marion Eppley Refuge in October, one of the largest refuges owned by Audubon. It is not open to the public and is maintained as an unspoiled and unbroken tract for wildlife habitat and study. Queen River Kayaks generously let us use their kayaks to paddle up the Queen's River to the landing at the refuge, where ASRI staff greeted us and took us on an interesting two hour hike. Be sure to check out our Events page on our website to see what we have planned for 2015!

*To Promote and Protect the Integrity of the Lands and Waters of the Pawcatuck Watershed*

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