

# SEBAGO LAKE

## WATERSHED NEWS

### WINTER 2014

Photo Credit: Kerry Freeman

Portland Water District · 225 Douglass Street · Portland, Maine 04104-3553 · 207.761.8310 · www.pwd.org



## District Installs New England's Second Largest UV Treatment Facility

By Laurel Jackson

*If you have driven down Route 35 through Standish recently, you may have noticed a huge crane looming over the water treatment plant where Routes 35 and 237 intersect.*

Or maybe you have noticed more trucks coming and going from the entrances to the facility. These vehicles and equipment are being used in a major construction project to install ultra-violet (UV) treatment at the Sebago Lake Water Treatment Facility. The facility treats water from Sebago Lake to make it safe for drinking, cooking, and bathing for over 200,000 people in the Greater Portland area. Since the facility was built in 1993, water from Sebago Lake has been disinfected using a combination of ozone (a form of oxygen) and chloramines (a chlorine-based compound). In 2014, UV light treatment will be added as an additional form of disinfection. Many of you are probably familiar with the terms “ultra-violet” or “UV” from buying sunglasses, but how and why is UV light used in water treatment?

UV light is a form of energy that is similar to light that humans can see but is invisible and contains more energy (see Figure 1). The sun is the major source of UV light in nature. The energy emitted by the sun contains visible light rays, UV rays, and

infrared rays (heat). UV light can also be man-made, such as the lamps used in tanning beds. Science has proven that UV rays cause damage to human skin cells, resulting in suntan, sunburn, and sometimes skin cancer, and that is why we wear sunscreen to protect ourselves. In addition to damaging human cells, UV light also damages other types of cells making it useful as a water disinfectant. It works to make water safe for drinking by penetrating potentially harmful cells (bacteria, viruses, and other germs) and destroying their DNA. With its DNA destroyed, it is impossible for a cell to reproduce which makes it unable to infect people and make them sick.

So now we know the “how” of UV disinfection, but what about the “why?” If the water is already being treated and is safe for people to use,



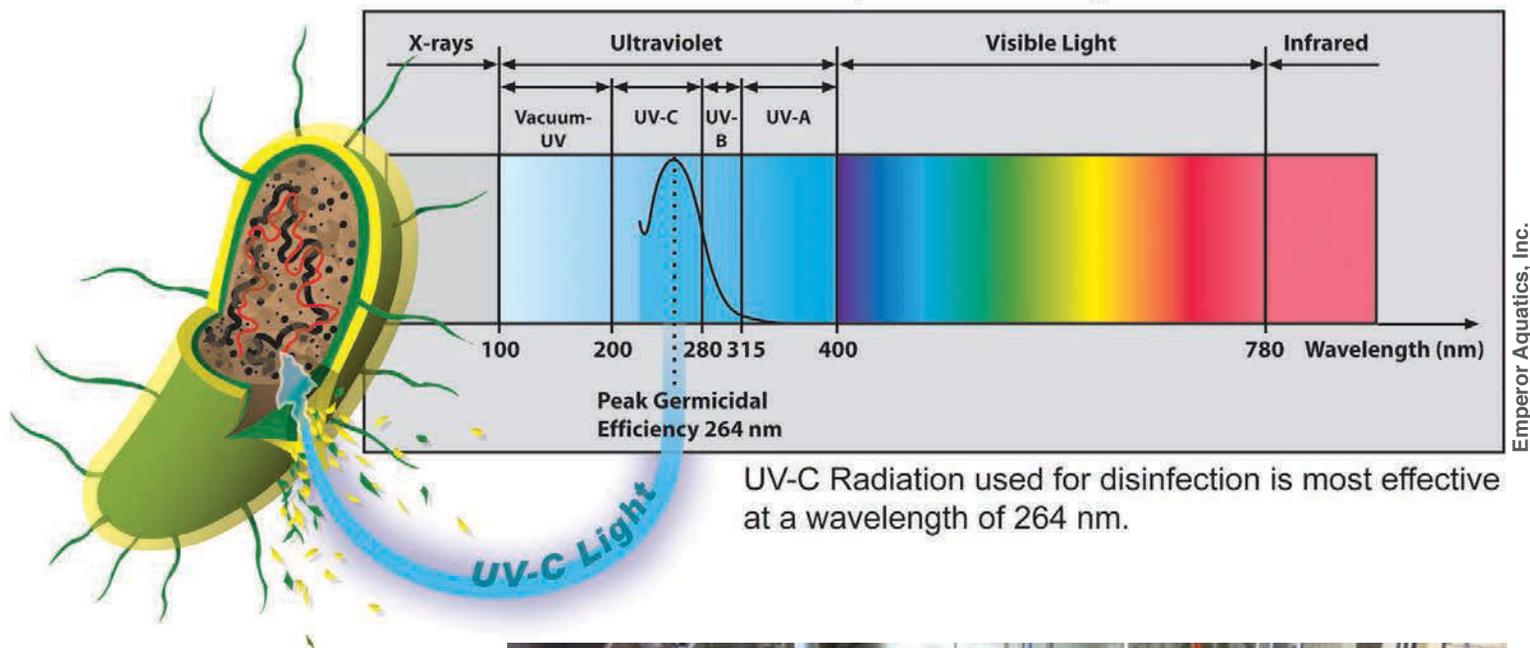
A UV reactor is delivered to the Sebago Lake Water Treatment Facility

why add another type of treatment? The answer is that ongoing research across the country identifies new contaminants and treatment must evolve to address the

*Continued on page 2*

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**Figure 1. The Spectrum of Light**



Emperor Aquatics, Inc.

UV-C Radiation used for disinfection is most effective at a wavelength of 264 nm.

risks they may pose. The Environmental Protection Agency made a new rule in 2006 that requires utilities that use surface water such as a lake, for drinking water to install additional treatment to protect against *Cryptosporidium* (crypto) infection. UV treatment has proved to be very effective at destroying *Cryptosporidium*.

The new treatment must be installed by April 2014 and the project at the Sebago Lake Treatment Facility is on track to meet that goal. Crypto is a microscopic parasite that can cause serious illness and is found in human and animal fecal matter. It can be found in recreational lakes as well as pools and hot tubs that have not been properly disinfected. Because crypto exists in a durable “cyst” form, it is more resistant to common disinfection methods such as chlorine (see the Water Watch section for more details about *Cryptosporidium* and the illness it can cause). Tests have shown that UV is effective at destroying crypto cysts. Although crypto has not been detected in the water we pull from Sebago Lake, there



UV equipment installed inside the Sebago Lake Water Treatment Facility

is still a risk that it could be present due to people swimming and wildlife using the lake. The addition of UV treatment will increase drinking water disinfection to a level where a crypto infection is nearly impossible! A benefit of using UV as a disinfectant is that, because it is not a chemical, it does not change the taste or odor of the water.

The construction project is nearly complete and a new treatment chamber has been installed that houses a series of 84 UV bulbs set to the optimum wavelength for disinfection. As water flows past the bulbs, the UV rays will destroy bacteria, crypto cysts, and other potentially harmful cells.

Operators are currently being trained in using the UV system and treatment will begin this year. Drinking water from Sebago Lake will continue to be treated with ozone and chloramines as well, so it will be disinfected in three different ways! In fact, along with the addition of UV treatment, the ozone system is being upgraded to a high-efficiency system that will save electricity and provide reliable ozone treatment into the future.

With the completion of the project, the Sebago Lake Treatment Facility will be the second largest UV facility in New England and another barrier of protection will be added to safeguard public health.



Laurel Jackson is a water resources specialist at the Portland Water District. She can be reached at [ljackson@pwd.org](mailto:ljackson@pwd.org)

# Native Plant Spotlight:

**MOSS PHLOX**  
(*Phlox subulata*)

Photos: Brie A. Holme



**Size:** Grows to about 6 inches high and spreads to form an attractive groundcover

**Foliage:** Leaves are thin, needle-like, and bright green. Flowers are typically varying shades of pink but different varieties can be found in purple and white.

**Bloom time:** Early to mid-spring

**Soil conditions:** Prefers well drained soils

**Light:** Full sun

**Zones:** 3-9

**Visit the Sebago Lake Ecology Center to see examples of this and other native plants!**



# WATER WATCH

## Cryptosporidium

By Nate Whalen

Photos: Mark Hunt, Huntstock.com

The District monitors Sebago Lake for fecal contamination.

### **Cryptosporidiosis is a nasty intestinal illness caused by a tiny parasite called *Cryptosporidium* – sometimes referred to as “crypto.”**

It is one of the most common waterborne diseases in America. Cryptosporidiosis is generally caused by swallowing contaminated water and there are about 9,000 documented cases in the U.S. each year. A 1993 outbreak in the Milwaukee public water supply infected 403,000 people, hospitalized 4,400 and killed 100. The Milwaukee Water District’s water filtration system could not protect people from a contaminated Lake Michigan. Crypto can make anyone very sick and can be deadly to the young, the elderly, and to people with compromised immune systems.

The microscopic organism persists in the environment for months, or even years, inside a protective shell (called a cyst) and is transmitted in human and animal fecal matter. Each time a carrier/host defecates, millions of these cysts are released into the environment. The cysts enter a water body by either washing into the water when it rains or by being directly deposited into the water. When the cysts are ingested by the next unsuspecting victim, their life cycle continues.

People often wonder why swimming is prohibited near the water intake pipes in Lower Bay. This is because the most effective way to keep crypto

from coming through the tap is to keep it out of the lake to begin with. And crypto is only one of many illnesses that can be transmitted through human bodily contact with the water.

Restricting human contact in Lower Bay is a precautionary measure the Legislature ordered in 1913. The law recognized the importance of source protection to reduce contamination.



Nate Whalen is a water resources specialist at the Portland Water District. He can be reached at [nwhalen@pwd.org](mailto:nwhalen@pwd.org).

# Sebago Lake Land Reserve: Celebrate Forests, Recreation, and Clean Water

By Sarah Plummer

## Join us on the Sebago Lake Land Reserve in 2014!

The 2,500 acre Sebago Lake Land Reserve is a managed forest intended to protect Sebago Lake, the drinking water supply for Greater Portland. The Land Reserve, located in Standish and Gorham, includes 1,700 acres that have been open to the public since 2005 for recreation such as hiking, snowshoeing, and horseback riding. Its trail network connects to well-known trail systems, including Sebago to the Sea and the Mountain Division trails.

Recently, PWD concluded a three-year project on the Land Reserve trails to improve access and usability. Trails were cleared, defined, and identified using GPS technology, a trail map was created, and signs were installed. To celebrate, an inaugural Trail Day was held in September 2013. Approximately 70 participants enjoyed the trails and learned about the local ecology.

### **UPCOMING EVENTS!** **Snowshoeing and XC Skiing on the Land Reserve**

Full moon snowshoe treks and cross country skiing outings are planned this winter on the Sebago Lake Land Reserve. Join PWD for moderately paced events. Participants must provide

their own equipment, and events are subject to weather conditions. Full moon snowshoe treks are planned for February 14 and March 18, 2014. Cross country skiing outings are planned for February 15 and March 15, 2014.

### **Trail Day 2014: May 10**

Join us as we celebrate National Drinking Water Week during the first week of May! Several water and ecology focused events will be held, including the second annual Trail Day on Saturday, May 10, 2014. Trail Day will include free guided events for all ages and interests. Activities will include adult and family nature hikes, preschool nature exploration activities, and faster-paced options like trail running and mountain biking.

### **Little Lake Stewards Story Time**

Our popular preschool program will run one Friday per month through the spring of 2014. Each two hour session focuses on a nature-related theme which is reinforced through books, a craft project, snacks, and outdoor exploration on the Land Reserve (weather permitting). Dates: February 21, March 21, and April 25, 2014.

**Space is limited and reservations are required for all events**, all of which are free of charge. E-mail [sebagolake@pwd.org](mailto:sebagolake@pwd.org) or call 207-774-5961 x 3320 to reserve your spot, learn more, or sign up for our e-mail list to keep up-to-date on our exciting and fun activities!

 Like us on Facebook to learn more about these events and our efforts to protect Sebago Lake.



Sarah Plummer is the environmental education coordinator at the Portland Water District. She can be reached at [splummer@pwd.org](mailto:splummer@pwd.org)



Trail Day 2013 participants

# What's Making Waves Around Sebago Lake?

By Chad Thompson



The oil pipeline hangs over Panther Run near Sebago Lake.

## District Working to Prevent Oil Spills

The Portland-to-Montreal oil pipeline is operated by the Portland Pipeline Company (PPL). It runs near Sebago Lake in Raymond and continues north along and across the Crooked River. Though upstream of Sebago Lake, if the pipeline were ever to leak, the lake could be impacted. The PPL has a spill prevention and control plan in place and the Portland Water District participates in their periodic exercise of the plan. The Water District Board of Trustees has directed staff to continue working with area fire departments and PPL to ensure that spill plans and procedures are updated and easily implemented.

There has been speculation that the Portland-to-Montreal pipeline could be used in the future to transport tar sands oil. In an effort to thoroughly examine the issue, Trustees have held public hearings involving tar sands opponents, PPL officials, and pipeline regulators. They have authorized the hiring of a pipeline consultant to provide expert advice and to review and suggest improvements to safety measures and spill procedures, if any are identified. These actions are aimed at making the operation of the pipeline as safe as it can be, regardless of the type of oil it is transporting.

## February Talk about Land Conservation in the Sebago Lake Watershed

Members from the public are encouraged to attend a gathering in Casco on the evening of February 17 featuring a presentation by Paul Hunt, Environmental Manager of the Portland Water District, describing the District's new Land Conservation Initiative. PWD's goal is to support landowners and towns that want to conserve their land because in addition to meeting the landowner's wishes, conserving land also helps protect the quality of water. To demonstrate that support, the District's Board of Trustees has voted to provide financial support of up to 25% of the value of conservation projects. Following the presentation there will be discussion and sharing of information about recent regional conservation accomplishments and trends. For more information contact the Loon Echo Land Trust at (207) 647-4352.

## SAPPI Launches Lake Level Blog

In August 2013, SAPPI launched a new blog to inform the public about changes in the water level of Sebago Lake. The blog is updated regularly with lake level and outflow numbers, the status of water releases from water bodies above Sebago Lake, effects of outflow on recreational facilities along the Presumpscot River, and information regarding lake level changes required by the lake level management plan. For more information, please visit <http://presumpscotriver.tumblr.com/>.

## Standish Town Beach

The Town of Standish continues to work toward a proposal to develop a public beach on Portland Water

District land outside of the no bodily contact zone on Sebago Lake. As a result of a request for proposals to area site design firms, the town has recently granted the contract for site design work to an engineering consultant from Gorham, Maine. Other recent work includes a site walk and delineation of a proposed access road right of way.

## 2014 Images of Sebago Lake Calendar: Available Now!

Copies of the ninth edition of the Images of Sebago Lake Calendar are now available at the Sebago Lake Ecology Center. The Calendar features shots of Sebago Lake taken by amateur and hobbyist photographers. Photos capturing the natural beauty of this remarkable resource vary with the changing seasons, water, and subjects. Some photographers are lifelong Sebago Lake residents while others capture a quick shot while passing by on their way to somewhere else. The consistent theme, however, is Sebago Lake's striking and constant beauty and a deep appreciation for the lake as a valuable resource.

Over 280 photographs from 46 amateur photographers were submitted for consideration for the 2014 Calendar. Stop in to pick up a copy Monday through Friday during normal business hours. Supplies are limited so one copy per person please.



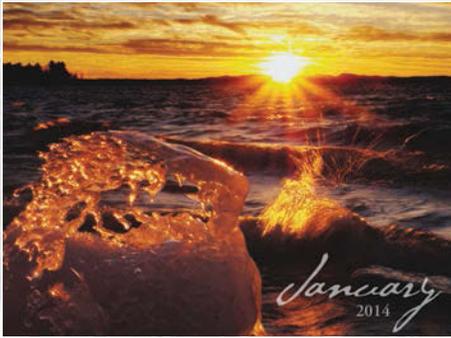
Pickerel Pond within the Perley Mills property.

# Climate Change is Affecting Sebago Lake

By Brie A. Holme



Calendar submission by Neil Hiltunen



Calendar submission by Kerry Freeman

## SEBAGO'S ICE COVER IS CHANGING

If you're a year-round Sebago Lake resident, you may have noticed the ice on Sebago forming later in the winter and melting earlier in the spring, if it even forms at all. This phenomenon is occurring on lakes throughout New England. It turns out Sebago Lake has one of the longest records of ice-out data, dating back to 1807. The lake is considered ice-free when Big Bay is free of ice. According to the report, *Climate Change in the Casco Bay Watershed: Past, Present, and Future*, Sebago Lake ice-out occurs an average of 23 days earlier today than it did in 1807. Figure 2 shows Sebago Lake ice out dates from 1807-2013\*. Over the period from 1935 to 2013, there were 13 years when the lake did not ice over completely – or once every 6 years on average. However, in the last 4 years this happened 3 times!

Shorter periods of ice cover result in longer growing seasons for algae. More algae leads to less clear water, less oxygen, and potential loss of habitat for cold water fish species. Fortunately for us, Sebago Lake is so large and has such clean, clear, oxygen-rich water that it will not be impacted as quickly or maybe even as completely as smaller lakes. The Portland Water District monitors for algae, water clarity, and dissolved oxygen to watch for trends.

## OUR PRECIPITATION IS CHANGING

In addition to earlier ice-out dates, we are experiencing changes in total annual precipitation and how often we experience extreme weather events. According to the *Climate Change in the Casco Bay Watershed* report, Portland's annual precipitation has increased by almost an inch per decade over the period of 1891-2006. In addition, we are now experiencing extreme precipitation events (greater than two inches of rain in 48 hours) more often. In Portland, there are now four more extreme precipitation events per year than there were in 1949.



Water Resources Specialist Nate Whalen gets ready to collect a sediment sample for the sediment chemistry study

What does all this rain mean for Sebago Lake? Well, it will not make the lake cleaner. When it rains, stormwater flows over the landscape, eroding soil and picking up pollutants like phosphorous, *E. coli* bacteria, and gasoline on its way to a stream or the lake. In addition to affecting water quality, extreme weather events can also damage infrastructure. Flooding can overwhelm culverts, leading to culvert failure and sometimes even road collapse.

Lakes are complex ecosystems and the future effects of climate change on Sebago Lake are not easily predicted. It is a good thing the lake is so clean and deep to begin with because it is less easily changed than a smaller, shallower lake. One thing is for sure: our climate has already begun to change. What can you do to help minimize the effects of climate change on Sebago Lake?

*Continues back page*

## Perley Mills Community Forest

Loon Echo Land Trust is collaborating with the towns of Denmark, Bridgton, and Sebago to protect the 1,600 acre Perley Mills property and create a community forest. The \$1,400,000 capital campaign was an ambitious project but Loon Echo is happy to announce that they met the fundraising goal and purchased the land in December 2013. With many important ecological, recreational, and economic features, the long term protection of this parcel as a public open space and managed forestland is an asset to surrounding communities. Since it is also within the Sebago Lake watershed, keeping the land forested is important for maintaining excellent water quality of the lake. Recognizing the value of land conservation within the watershed, the Portland Water District contributed \$50,000 toward the project.



Chad Thompson is the source protection coordinator at the Portland Water District. He can be reached at [cthompson@pwd.org](mailto:cthompson@pwd.org)

Background photo: Bruce Small

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**WHAT YOU CAN DO:**

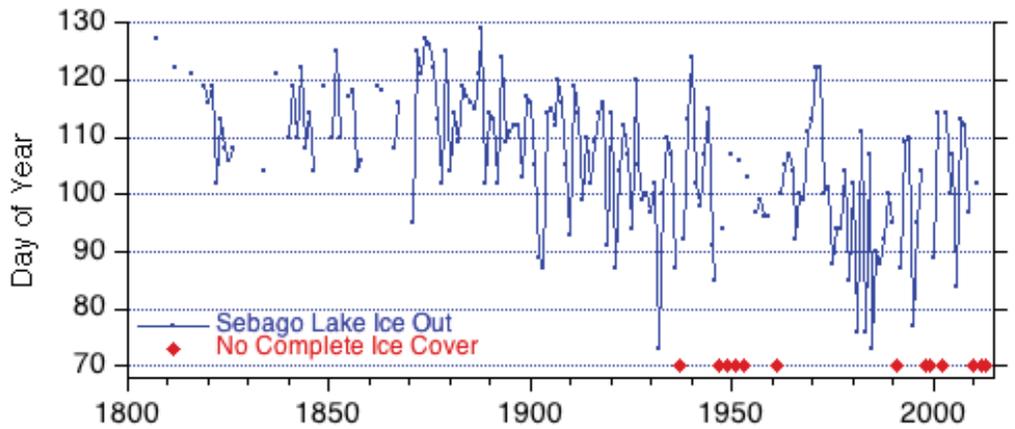
• Become a Sebago Lakescaper. Contact PWD at [sebagolake@pwd.org](mailto:sebagolake@pwd.org) for a free site visit to learn how to make your lakefront property less likely to erode in a storm, and more beautiful as well. You may even be eligible for a matching grant for installing measures to prevent soil erosion and to slow down and absorb runoff.

• Visit the US EPA's website to find 10 simple things you can change at home to reduce your carbon footprint: [www.epa.gov/climatechange/wycd/home.html](http://www.epa.gov/climatechange/wycd/home.html) You'd be surprised at how simple it can be--from replacing light bulbs to recycling, you can make a big difference.

**For more information on climate change and Sebago Lake:**

*Climate Change in the Casco Bay Watershed: Past, Present, and Future:* [www.cascobay.usm.maine.edu/pdfs/Climate\\_Change\\_in\\_Casco\\_Bay.pdf](http://www.cascobay.usm.maine.edu/pdfs/Climate_Change_in_Casco_Bay.pdf)

\* Figure 2 by Cameron P. Wake, PhD, Research Associate Professor of Climatology and Glaciology, UNH, with data from: Hodgkins, G. (2010) Historical Ice-Out Dates for 29 Lakes in New England, 1807-2008, USGS Open-File Report 2010-1214 <http://pubs.usgs.gov/of/2010/1214/pdf/ofr2010-1214.pdf>



\* Fig. 2: Ice out dates (number of days past January 1st) for Sebago Lake, 1807-2013. Red diamonds indicate years when Sebago did not freeze over completely.

**Climate Change Can Lead to Phosphorous Recycling**

Stormwater flowing into a lake carries pollutants with it. Maybe the most concerning of these is phosphorous because it is the food that algae need to grow and multiply. Too much phosphorous leads to too much algae and therefore green, murky water.

Luckily, lakes have a way of dealing with the problem of too much phosphorous. Much of it settles to the bottom and is buried in the sediments. But as a lake gets warmer and warmer the water holds less and less oxygen, particularly

near the bottom in late summer. If the bottom water in a lake loses all its oxygen, this can release the phosphorous from the sediments into the water column where the algae can use it. This is truly a lake catastrophe since that release of phosphorous will occur year after year and the lake will bloom bright green with an explosion of algae. It ruins everything.

Fortunately, Sebago Lake water quality remains excellent and the bottom waters consistently have plenty of oxygen, even in late summer. We just have to hope changes in climate don't alter this situation.

There is one other factor that could work in our favor – the chemistry of the bottom sediments. According to lake scientists at the Maine DEP, bottom sediments with a lot of aluminum are more able to hold the phosphorous, even if there is little or no oxygen in the water. In 2013 the PWD began testing the bottom sediments to find out if Sebago Lake is fortunate to also have this safeguard. The results are not yet in, so stay tuned to see what we found!



Flooding can cause culvert failure and sometimes even road collapse, which happened in April of 2005 where Rte. 114 crosses the Sticky River in Standish.



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