

# SEBAGO LAKE

WATERSHED NEWS  
SUMMER 2012

Photo Credit: Roberta Milward

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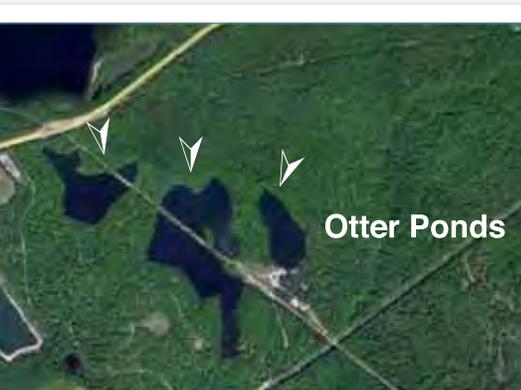
## Things are different now By Paul Hunt and Nate Whalen

*"The lake is not like it used to be."*

You've likely heard this statement if you are around long time visitors to Sebago Lake. They may say the lake used to be less crowded, had fewer buildings along the shoreline, or produced more and bigger fish. They may also say the coves had fewer plants or the water quality was better. But was it? How has the lake changed over time?

### Origins

Sebago Lake is about 14,000 years old, formed at the end of the most recent glacial era in Maine. It was formed in the valley of a river that flowed from the headwaters of the Androscoggin River, through Bethel and the Otter Ponds area at the southern end of the lake. This ancient river eventually reached the sea near the mouth of the Stroudwater River in Portland.



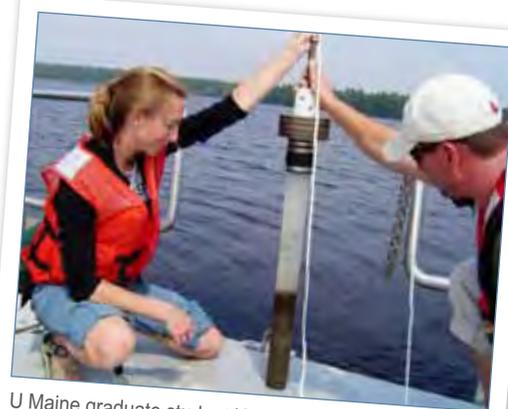
Otter Ponds

The area was once completely covered with glacial ice and as the ice retreated, meltwater left behind massive amounts of silt, sand, and gravel. In fact, the Otter Ponds in Standish are kettle

ponds – places where blocks of ice left by the retreating glacier melted into the depressions they formed. In some places this silt, sand, and gravel is more than 200 feet thick! The deposited material blocked the river and a new river channel formed in the White's Bridge area of Standish and Windham – the present day outlet of Sebago Lake.

As the ice first advanced and then retreated, it scoured out a very deep channel. Some bedrock types erode more easily than others. Big Bay – the deepest part of the lake – is underlain by Sebago granite. This rock is more easily eroded and thus was scoured out more deeply than the southern part of the lake which is underlain by metasedimentary rocks. As the ice melted, the valley that had been carved by ice filled with meltwater.

At more than 300 feet deep in Big Bay, Sebago Lake is the deepest lake in New England. But this incredible depth actually understates the depth to which the rocks were carved by glacial ice. This is because the glacial valley has been filled in by a great deal of sediment since the ice retreated. The Maine Geological Survey used a method known as side-scan sonar to determine the depths and types of sediments beneath Sebago Lake. They found that Big Bay is underlain by more than 130 feet of sediment - layers of silt, clay, and sand. So in



U Maine graduate student Kristin Strock and PWD Water Resources Specialist Nate Whalen collect a sediment core from Sebago Lake.



Back on shore U Maine graduate student Kristin Strock scrapes layers of sediment from the core for later analysis while Jasmine Saros, Associate Professor and Associate Director of U Maine's Climate Change Institute, looks on.

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reality the bottom of the basin that holds Sebago Lake is almost 450 feet beneath the lake surface!

## Bottom sediments tell a story

There really is a time machine! Scientists can look back in time by studying the sediments on the bottom of a lake.

Everything that lives, dies, falls in, or gets washed into a lake eventually sinks to the bottom. These bottom sediments leave a record in the mud like pages in a history book. Understanding how to read these pages and figuring out what they mean is the hard part.

Scientists from the Portland Water District and the University of Maine at Orono teamed up to study the sediments on the bottom of Sebago Lake. Layers of mud were collected from the bottom of Lower Bay using a straw-like instrument to preserve the layers of the sample. Every layer of mud goes deeper and deeper into the past. The top layers tell us about current times, while deeper layers of mud can tell us what the lake was like before the days of Christopher Columbus.

## What the mud tells us

One important thing to look at is the remains of microscopic creatures and algae found in the mud. Particularly useful are the diatoms. This group of organisms are phytoplankton – floating plants that make up the bottom of the food chain in a lake. Diatoms are useful for two reasons:

- They are sensitive to changes in water quality. Some prefer murkier, warmer water and others prefer clearer, colder water; and
- They have a glassy skeleton which settles to the bottom and can be preserved for centuries.

By identifying the numbers and types of diatoms at different layers of the mud core, some hints about how the lake has changed over time can be inferred. Other things in the sediment can be useful indicators, too. The Sebago Lake sediments reveal these things about the lake's history:

**1. Winds may be calmer today.** The diatom *Aulacoseira subarctica* has decreased in number since about 1850 AD while the diatom *Discostella stelligera* has increased in number over a similar time period. This suggests that patterns of mixing in the lake have changed from deeper mixing in the past to shallower mixing today. This is what would be expected if conditions are getting less windy.

**2. The lake was probably cleaner 400 years ago.** The diatom *Asterionella* has gradually increased in abundance since about 1750 AD. The sediments reveal about 2.5% *Asterionella* in the 1600-1800 time period and about 5.5% *Asterionella* in the 1800-2000 time period. The two samples from the very top of the mud core – representing the period from 2000-2010, had about 8% *Asterionella*. These increases probably correspond to periods of increased nutrients in the lake water – what most of us would call dirtier water.



*Aulacoseira subarctica*, magnification 200X



*Asterionella*, magnification 200X



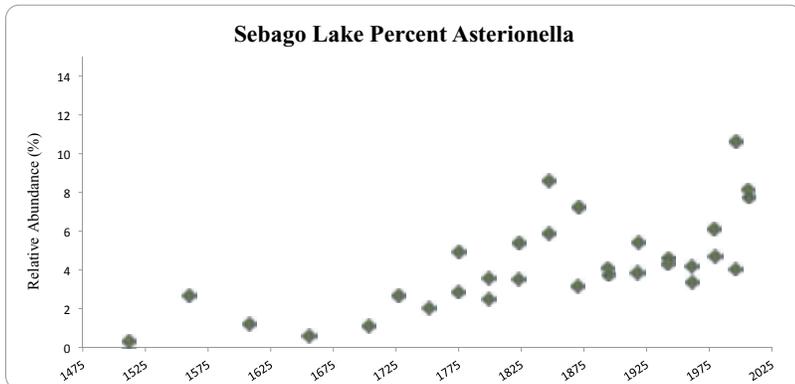
*Discostella stelligera*, magnification 400X

**3. Low levels of diatoms overall indicate the lake is clean.** While the percentage of *Asterionella* among the diatoms in the sediment is greater now than in the past, the overall story told by the diatoms is a good one. The total count of all diatom parts in the sediments is very low throughout the time period represented by the core, meaning that Sebago has been a clean, healthy lake for the past 400 years.

**4. Higher levels of pigments in the 1800s may indicate a period of increased algae.** The pigments in the sediments tell a similar story, but with a twist. Algae are plants and, like land plants, they contain

green-colored chlorophyll. When they die this chlorophyll becomes part of the bottom sediments. So the more green pigment in ancient lake sediments, the more algae in the lake at that time. The amount of green pigment in Sebago's sediments is low now and has been low from 1600-present – telling a story similar to that indicated by the diatoms. However, the amount of pigments in the sediment is highest in the 1800s. This may indicate that Sebago experienced a period of nutrient enrichment – dirtier water - in the 1800s.

Sebago Lake Percent Asterionella



Gradual increases in the algae *Asterionella* probably correspond to periods of increased nutrients in the lake water (dirtier water)

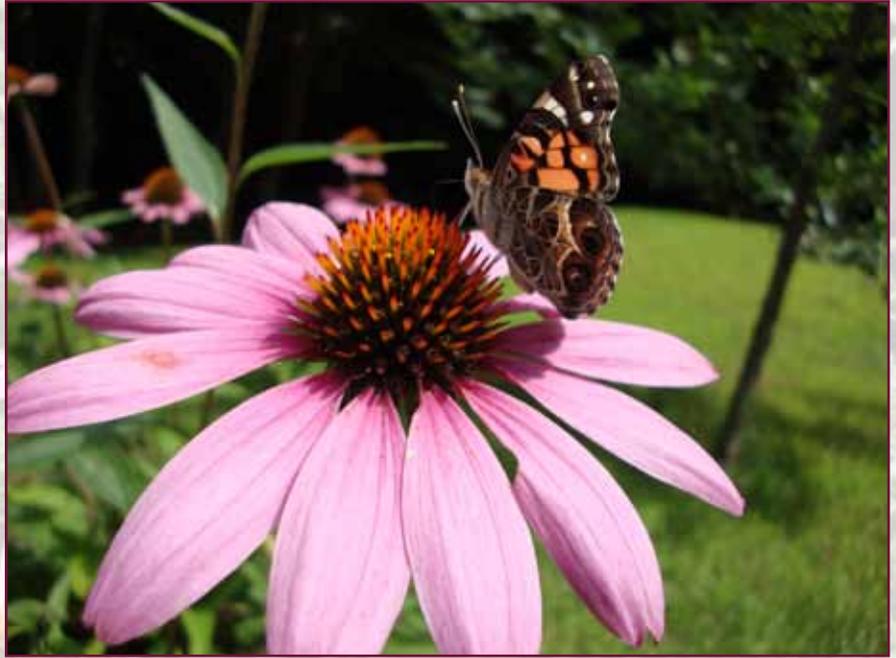


Paul Hunt is the environmental services manager at the Portland Water District. He can be reached at [phunt@pwd.org](mailto:phunt@pwd.org).



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

# Native Plant Spotlight: **ECHINACEA** (*Echinacea purpurea*)



**Size:** Perennial that grows 1 to 3 feet tall with a spread of 1 to 2 feet depending on the variety.

**Foliage:** Large, daisy like flowers can be red, white, or light purple.

**Soil conditions:** Moist, well drained to dry soils.

**Light:** Full sun

**Zones:** 3-10

**Great addition to a garden to attract bees and butterflies!**

Visit the Sebago Lake Ecology Center to see examples of native plants!



# WATER WATCH

## Zooplankton in Sebago Lake

By Kirsten Ness



Zooplankton from Sebago Lake (rotifer)



Zooplankton from Sebago Lake (copepod)

**Zooplankton is a word derived from the Greek words “zoon” meaning animal and “planktos” meaning wanderer or drifter.** In other words, zooplankton are animals that drift in the water. In freshwater ecosystems, the majority of zooplankton are too small to be seen with the naked eye. They feed on algae and other particles in the water and are eaten by some fish species. Lake scientists monitor zooplankton, along with algae and fish, to help characterize lake health.

PWD has been collecting zooplankton samples at two sites monthly during the open water season (May – Oct) since 2006. One site is located at the northern end of the lake near the outlet of the Songo River. The second site is located in

PWD collects zooplankton using this zooplankton tow net

the lower bay of the lake where there is no bodily contact allowed with the water.

We have found that the abundance of zooplankton collected does not differ between the two sites, however, analysis of species diversity and body size data needs to be completed. PWD will continue to monitor zooplankton in Sebago Lake, as a larger dataset is needed in order to determine if trends in zooplankton populations exist.



Kirsten Ness is a water resources specialist with the Portland Water District. She can be reached at [kness@pwd.org](mailto:kness@pwd.org).

# Tree Invaders!

## Hopefully NOT Coming to a Forest Near You!

By Karen Coluzzi, State Pest Survey Coordinator, Department of Agriculture and Allison Kanoti, Forest Entomologist, Maine Forest Service

**The Asian longhorned beetle and the emerald ash borer are two invasive woodboring beetles that are destroying trees in many states in the eastern U.S.** Although neither insect has been found in Maine, we can't be certain that they are not here in low, undetectable levels. The Maine Department of Agriculture and the Maine Forest Service are asking that all citizens report any suspected sightings of these beetles or suspicious tree damage. The Asian longhorned beetle attacks many hardwood trees, primarily maple, birch, elm and willow, while the emerald ash borer attacks only ash trees. Both insects are very hard to control once they become established. To learn more about these beetles, and to report any suspicious sightings, please go to [www.maine.gov/alb](http://www.maine.gov/alb) and [www.maine.gov/eab](http://www.maine.gov/eab).

Hemlocks are threatened by two invasive sucking insects (related to aphids): hemlock woolly adelgid and elongate hemlock scale. Hemlocks are common trees near surface water and play an important role in reducing the costs of

clean drinking water. They protect the quality of water because they help filter it and hold soil in place along many of Maine's lake, pond, river and stream shorelines. Both elongate hemlock scale and hemlock woolly adelgid have made inroads into the forests of Maine and traveled even farther on planted trees. Together they threaten the long-term viability of our forest and ornamental hemlocks. Learn how to recognize these two destructive insects so you can help to slow their spread into our hemlock resources and please let us know if you think you have found them: [www.maineforestservice.gov/HemlockWoollyAdelgid.htm](http://www.maineforestservice.gov/HemlockWoollyAdelgid.htm) or [www.maineforestservice.gov/EH\\_Scale.htm](http://www.maineforestservice.gov/EH_Scale.htm).

Handy, durable, credit card-sized identification aids are available for all four of these pests. You may request them by e-mail at: [bugwatchme.agr@maine.gov](mailto:bugwatchme.agr@maine.gov) or call (207) 287-7551.

For More information, stop by the Sebago Lake Ecology Center, corner of Routes 237 and 35 in Standish.



Asian Longhorned Beetle



Emerald Ash Borer



Hemlock Woolly Adelgid



Elongate Hemlock Scale

# What's Making Waves Around Sebago Lake?

By Brie Holme

## PWD and Standish Agree in Principle on a Site for a Town Beach

The Portland Water District Board of Trustees unanimously approved a memorandum of understanding (MOU) to provide land to Standish for a beach. The location selected by the Standish Beach Committee is on the Cargill lot on the western shore of the lake. The parcel is outside the two-mile limit and includes the Sandbar Beach. The MOU states that the parties will now work together to develop a beach design, a management plan, and a lease agreement.

## District Donates \$\$ for Conservation Easements

The District continues to make cash contributions toward conservation easements placed on land in the Sebago Lake watershed. This spring Loon Echo Land Trust was awarded a contribution for a conservation easement on a 28 acre parcel on the Tenney River in Raymond. The parcel includes 900 feet of frontage and is owned by the Boy Scouts of America. The Tenny River flows from Crescent Lake to Panther Pond, and the water enters Sebago Lake through Panther Run. Last year our support helped preserve over 700 acres of land around Sebago Lake, including Camp Wawenock's 90-acre conservation easement on the shores of Sebago Lake in Raymond. Contact us at [sebagolake@pwd.org](mailto:sebagolake@pwd.org) for more information about a PWD contribution toward your conservation easement.



Photo Credit: Bob and Marian Wright

## Become A Sebago Lakescaper and earn up to \$2,000

Improve your property or camp road and protect the lake with a matching grant from Portland Water District. Our Sebago Lakescaping Program offers matching grants of up to \$1,000 for individual land owners and up to \$2,000 for lake and road associations, businesses, commercial summer camps, not for profit organizations, and other groups. If your property is within 250 feet of Sebago Lake or a major tributary, contact us at [sebagolake@pwd.org](mailto:sebagolake@pwd.org) for a free site visit and to find out if you are eligible.

## U Maine Sustainability Project Update

A project to examine water flow through local streams and into Sebago Lake is being conducted by the University of Maine and University of Southern Maine and is funded through a grant from the National Science Foundation. The group plans to release a basic model online in early summer. The team is also evaluating water quality in the lake and land use change in the watershed, with plans to develop a model to estimate the effects of land use changes on lake water quality. For more information please visit [http://www.umaine.edu/sustainabilitysolutions/sustainability\\_science/SSI\\_projects\\_yr1/jain\\_et\\_al.htm](http://www.umaine.edu/sustainabilitysolutions/sustainability_science/SSI_projects_yr1/jain_et_al.htm)

## PWD's Source Protection Program wins National Award

The Portland Water District is the recipient of the "Exemplary Source Water Protection Award," Presented by the American Water Works Association. The District was nominated for this national award by the Maine Drinking Water Program, which was particularly complimentary of the District's efforts to work with so many towns, agencies, and organizations to protect the lake.



## Crooked River Watershed Survey Report Published

The newly published Crooked River Watershed Survey Report is now available at [www.cumberlandswcd.org/publications/index.htm](http://www.cumberlandswcd.org/publications/index.htm) The report prioritizes erosion problems and recommends improvements for sites through out the Crooked River Watershed. The Cumberland County Soil and Water Conservation District will apply for federal funds in June 2012 to correct some of the erosion problems outlined in the report.



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

# Summer at the Ecology Center

This summer, the Portland Water District will host a series of interactive presentations at the Sebago Lake Ecology Center in Standish. The presentations will teach about the threats to Maine lakes and will discuss a variety of ways you can help protect Sebago Lake.



Photo Credit: Wendy Rosenberg

**July 10, 6:30-8:00 p.m.**

## **The Common Loon: A Symbol of Maine Wilderness and Indicator of Lake Health**

*By: Camilla Fecteau, Wildlife Biologist, St. Joseph's College Biology Instructor*

Have you wondered what the different loon calls mean? Are you interested in loon biology? The Portland Water District is pleased to offer an informative presentation to answer these questions and many more.

**July 17, 6:30-8:00 p.m.**

## **Lakescaping - A beautiful way to protect the lake!**

*By: Kirsten Ness, PWD Water Resources Specialist*

Learn how you can use plantings and buffers to prevent erosion, keep Sebago clean, and keep native habitat thriving. Yes, you can have a beautiful and lake-friendly shorefront!



Photo Credit: Bob and Marian Wright

**July 23, 6:30-8:00 p.m.**

## **Lakes 101—How Lakes Work**

*By: Laura Wilson, Water Quality Professional, UMaine Cooperative Extension*

How DO lakes work? How did Maine lakes form, what happens below the surface, and how does the land help determine lake water quality?

**July 31, 6:30-8:00 p.m.**

## **Are there critters in the lake? We hope so!**

*By: Nate Whalen, PWD Water Resources Specialist*

Did you know that insects can indicate clean water? Learn how PWD monitors natural living organisms in the lake and tributaries.

The series will be presented by PWD Resource Protection staff and partners and are designed to be casual and interactive with lots of opportunity for participant Q & A.



Photo Credit: Rich Antinarelli

**July 21, 7:00-7:30 a.m.**

## **SEBAGO'S LOONS!**

Please volunteer on July 21 for the 29th Maine Audubon Annual Loon Count on Sebago Lake. The count takes place from 7 a.m. – 7:30 a.m. and is held rain or shine (or wind). All you need is a boat or kayak and a willingness to get out on the lake bright and early. Sebago Lake is large and the more we can cover, the more accurate count we will get. If you are interested, please contact Nate Whalen at [nwhalen@pwd.org](mailto:nwhalen@pwd.org) or stop in at the Sebago Lake Ecology Center.

## **Registration is required for all events.**

Enrollment is free. Class limit is 20.

Location: Sebago Lake Ecology Center at the corner of Routes 237 and 35 in Standish.

**FMI or to register:** call or email 774-5961 ext 3324 or [lrichard@pwd.org](mailto:lrichard@pwd.org).

# HISTORIC SEBAGO LAKE



This photo is from 1908 and shows the original Portland Water District intake building. The view is from Chadbourne's Landing on Route 35, looking across the lake. The original intake building was built in 1868 and used until 1925, when a new intake building was constructed. The 1925 Intake building is still in use today.



This large ice house operated on the west shore of Lower Bay. D.W. Clark and Company advertisement from 1870 boasts of an "absolutely inexhaustible supply" of ice from Sebago Lake. The ice house was decommissioned in the mid-1930's.



Raymond Neck, Frye Island, Indian Island, and the Standish Neck area, April, 1930.

Many more historic photos of Sebago Lake are available at  
[www.pwd.org/environment/sebago/Historic\\_Sebago\\_Lake.php](http://www.pwd.org/environment/sebago/Historic_Sebago_Lake.php)



The Sebago Lake Watershed News is published by the Portland Water District.

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