

The Beaver Lake Monitor

A publication of the Beaver Lake Management District Advisory Board

<http://www.ci.sammamish.wa.us/BLMD.aspx#Home> Volume 9, Issue 1 July 2008



The importance of being an aquatic plant



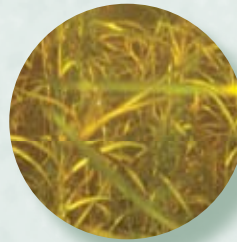
Lake users sometimes think that plants flourishing in lakes either indicate environmental

problems or that the lake is “dying.” This is far from the truth! While suddenly luxuriant plant growth in a lake may herald a noxious weed invasion or a change in nutrients or other growing conditions, native aquatic plants occur naturally in all lakes. They are integral to the healthy functioning of lake ecosystems, which could suffer in many different ways if all aquatic plants were suddenly removed.

Far from causing oxygen depletion, as occasionally claimed in publications or articles, aquatic plants generally

produce more oxygen during photosynthesis than they can consume through the day, actually adding oxygen to the water for animal use. However, when there are very large numbers of plants in a lake out of balance, bacterial decomposition of dead plant material may consume oxygen in the water, hence the mistaken notion that aquatic plants cause low oxygen levels.

Aquatic plants also create structures in lake water that give small fish and amphibians a place of refuge from predators. In addition, they act as surfaces for tiny organisms to attach and grow, which increases food availability. Whole communities of tiny creatures live among aquatic plants, increasing diversity.



Rooted plants living in lakes are limited to shallow depths where light can reach the bottom. In very clear lakes, they can be found in deeper water than in lakes with the water clouded by suspended sediment, organic molecules or algal blooms. Some plants grow close to the bottom, while others stretch to the light and can reach several yards in length.

Most aquatic plants with roots get their nutrition from the bottom sediments instead of from the lake water. However, in lakes with low over-all productivity, sediments may not be rich enough in nutrients

to support dense plant growth. In others, the wind may create waves that winnow fine sediment out of the shallow water, limiting the amount of nutrients available. Shallow lakes with moderate algal productivity, which are protected from wind, may support dense populations of aquatic plants.

Some plants like their roots in or near the water in saturated soils, but prefer to grow above water levels along the lake margins. These “emergent” plants intercept nutrients and sediment flowing off the land, acting as filters to cleanse water coming into the lake. They shade the shallow sediment, stabilize shorelines, and disperse the energy of waves coming in. They also act as refuge and habitat for small birds, amphibians, and insects such as dragon flies.

A number of invasive, alien plants have invaded lakes and lake margins in the Puget Sound region. These invaders have no natural predators to keep them in check and can often overcome the native species to form large, single species stands of vegetation. Some have been identified legally as noxious weeds mandated for eradication or control, while others are too widespread to be eradicated. Noxious weed control is key to ecosystem stewardship, but at the same time the native plants should be cherished and encouraged in order to keep an ecosystem functioning at its best.

Knowing which plants are



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Want to learn more about keeping Beaver Lake healthy?

The Beaver Lake Management District Advisory Board wants to know if LMD members would like a public question and answer session with the authors of recently published update to the Beaver Lake Management Plan, which is online here: http://www.ci.sammamish.wa.us/pdfs/projects/BLMD/FINAL_dec07_rev-apr00.pdf

If you would like to have a public meeting, please send an email to sally.abella@kingcounty.gov with the subject “Beaver LMP update meeting request”. If there is interest, a meeting will be organized and publicized soon.

Water Quality Update



King County staff members install a flow meter and auto sampler at the tributary to Little Beaver Lake

BLMD Water quality Monitoring Program

The Beaver Lake Management District (BLMD) contracts with the King County Lake Stewardship Program to track water quality in Beaver Lake and the creeks that flow into the basins. Inlet sampling starts in the fall when the creeks begin to flow due to the onset of autumn rains, and the monitoring season ends in late spring when the flow slows to a trickle. Samples are also collected during or immediately after several rainstorms each year, based on a variety of criteria and timing of the storms. These water quality data help the BLMD advisory board and the City of Sammamish identify management, protection, and restoration priorities within the district.

What We're Tracking

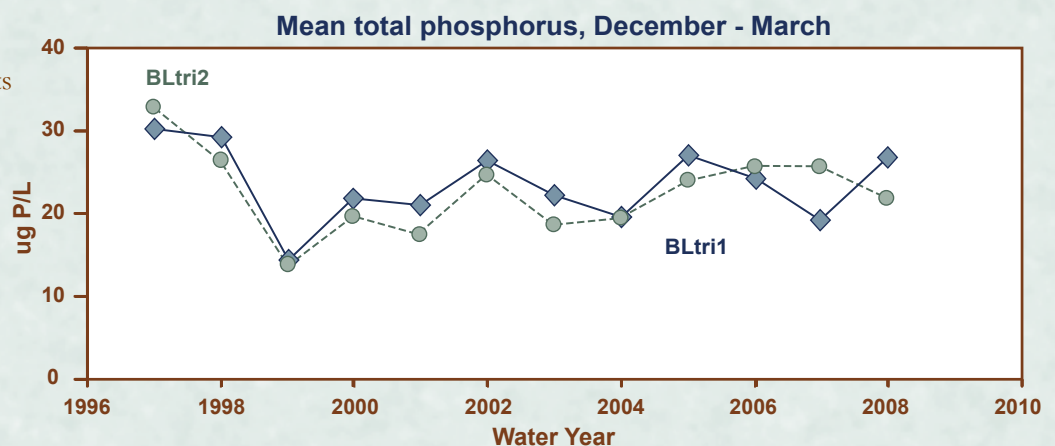
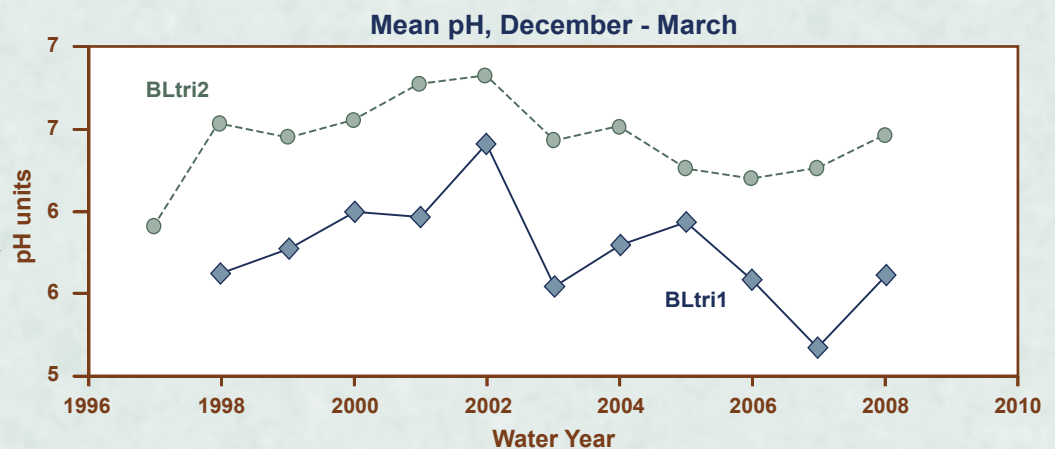
Although a variety of measurements are important in determining overall water quality, two parameters are of particular interest to the BLMD: phosphorus and alkalinity. This is because changes in these parameters are often associated with increased development.

PHOSPHORUS is a naturally occurring element and is necessary in small amounts for both plants and animals. However, many actions associated with residential development can increase concentrations beyond natural levels. Higher phosphorus levels can lead to more frequent and dense algae blooms – a nuisance to residents and lake users, and a potential safety threat if blooms become dominated by species that can produce toxins.

TOTAL ALKALINITY measures the water's capacity to resist changes in pH (acidity). Soft water has low alkalinity values, and hard water has high alkalinity values. Big and Little Beaver Lakes are both "soft water" lakes, with relatively low alkalinity (measured as milligrams of calcium carbonate per liter). Alkalinity often increases with new development, both as a result of cement and concrete leaching calcium carbonate into the environment and as a consequence of disturbing local soils and adding fill. This can change the lake's natural pH cycle, which may affect plant and animal populations adapted to the soft water, slightly acidic waters of Beaver Lake. However, few studies have documented specific changes and outcomes.

Other Measurements Include:

- Total suspended solids
- Temperature
- Dissolved oxygen
- pH
- Conductivity
- Water color



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The Formation of Beaver Lake

By D. Bruce Morgan

Beaver Lake Management District Board Member

Many of you who live in the Beaver Lake watershed or who have spent time at the lake may have questions about how and when Beaver Lake came to be. Well, the story starts about 20,000 years ago when the latest period of glaciation in the Pacific Northwest began. A vast ice sheet in British Columbia responded to cooler global temperatures and began expanding southward to the Puget lowland, becoming the Vashon glacier. By 15,000 years ago the edge of the ice sheet had arrived in the Sammamish area, along the way grinding up vast amounts of rock underneath, carving features we can recognize today, and leaving thick glacial till deposits.

At the peak of glaciation, the ice sheet extended to a point south of Olympia and the Sammamish region was buried by over one-half mile of solid ice. The southerly movement of the ice sheet and its associated meltwater carved a series of north-south depressions that would later become Puget Sound, Lake Washington, and Lake Sammamish. Other areas were scraped and carved by the glaciers into elongated cigar-shaped hills (drumlins) oriented in a similar north-south direction. The crushing weight of the ice compacted the finely ground rocks beneath into dense, hard soil that today is called hardpan, nature's concrete, or more technically, Vashon lodgment till.



 *Erractic 2 at Beaver Lake*



 *Erractic 4 at Beaver Lake*

As the climate warmed, the glacier's edge began retreating. Within 2,500 years of its arrival in the Sammamish area, it had already retreated to the north and the landscape evolved into what we would recognize today. One of things that many people do not realize about glaciers is that they discharge huge amounts of water carrying heavy loads of rock debris, sand, and gravel accumulated along the entire length of the ice sheet. As the glacier retreats (melts back), the rock debris drops along the front of the glacier, while finer sands and gravel are deposited by meltwater emerging from the base of the glacier. Unlike the till that is overridden by the glacier, these deposits are not compacted by a great weight, and therefore are loose and permeable, often making great aquifer beds.

By now you may be wondering how this is related to formation of Beaver Lake? Well, when a glacier retreats, large chunks of ice can break off from the face and become partly buried by the sand and gravel deposits left behind (somewhat similar to ice sheets that calve off pieces into the ocean). The sand and gravel insulation retards melting, but over time the ice block disappears, water fills the remaining depression, and there we have Beaver Lake. The geologic term for such a lake is "kettle". Other examples of kettle lakes include nearby Pine Lake, Green Lake in Seattle, and Steilacoom and Gravelly Lakes near Tacoma.

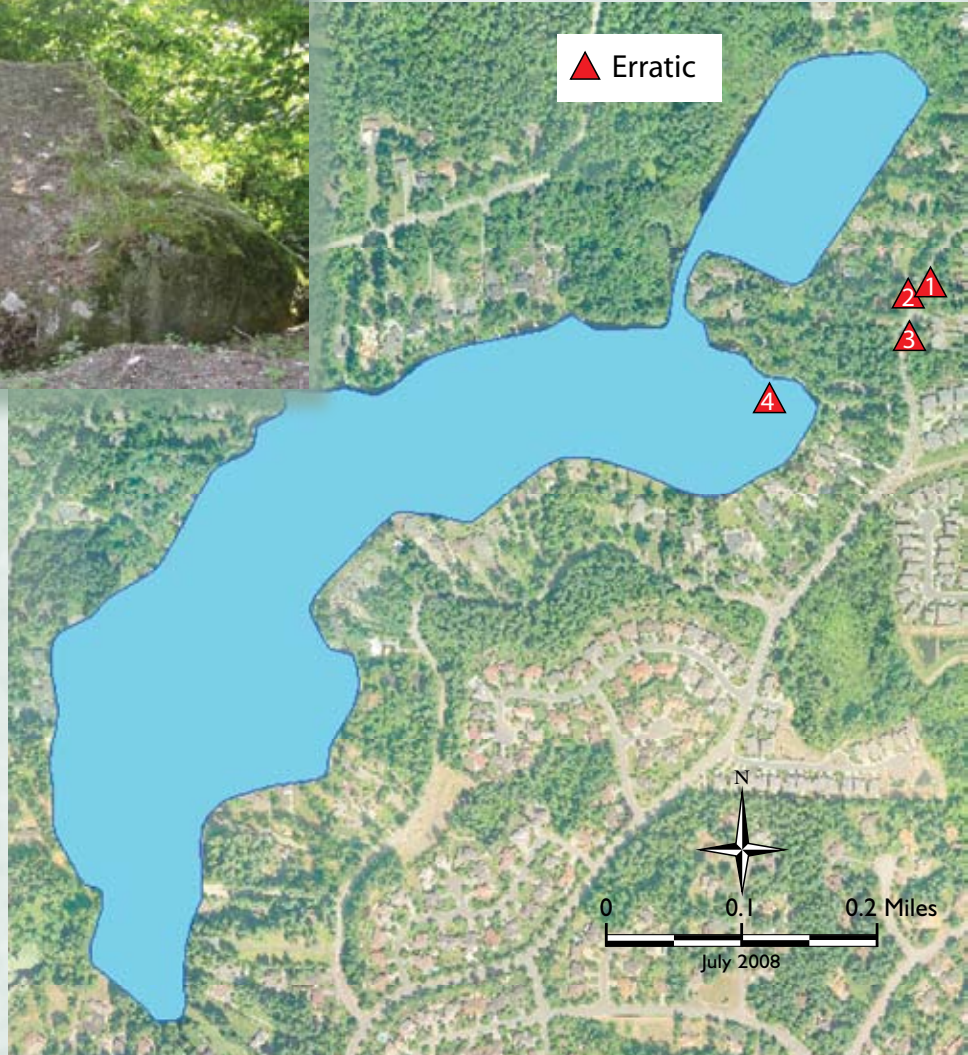
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▲ *Erratic 3 at Beaver Lake*

Two other things are worthy of noting. One is that permeable sands ring Beaver Lake, acting as excellent conduits for groundwater to reach the basins. While each basin of Beaver Lake is fed by a small surface stream, it is easy to find cold ground water upwelling from the bottom, which can really surprise swimmers. Before the local water district existed, some homeowners pumped their water directly from the lake and would attempt to locate their intake line over one of these cold areas. (I can state from experience that it was not always completely successful.) This may also illustrate how some pollutant sources in the watershed can find their way to the lake.

Also of interest around Beaver Lake are large boulders that the glacier left behind. The geologic term for these is “erratics,” referring to the fact that the boulders do not represent local rocks and have probably been transported a great distance. A very large glacial erratic is located in the NE corner of the main Beaver Lake basin about 10 feet from the shoreline, projecting about five feet above the water (see map). It was originally free standing in the lake, but in the 1960s a causeway was connected to the rock from an adjacent property. Not far away, two more large erratics tower over each side of E Beaver Lake Dr SE near SE 18th Pl. A quick calculation suggests that the larger of the two may have a weight approaching 100 tons.

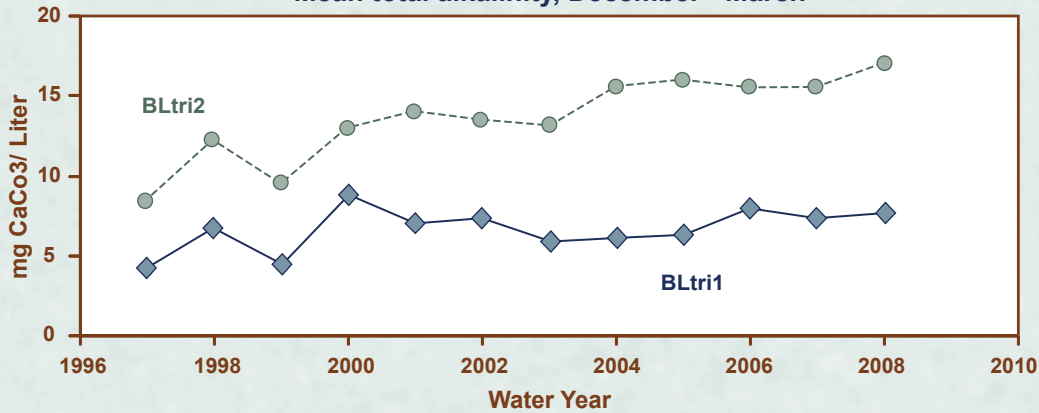


The BLT: More than just a delicious sandwich!

For the 15th year in a row, athletes will come to Beaver Lake from near and far to swim, bike and run through the area. This year's Beaver Lake Triathlon promises to be fun for all involved.
Date: Saturday, August 16th, 2008
Start Time: 7:45 a.m.
Race registration at <http://www.beaverlake.org/2003blt/blt.htm>
We need volunteers! Please contact Sharon Freethle, Race Director at blt@beaverlake.org or leave a message at 206-557-6902.

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Mean total alkalinity, December - March



What's new in Sammamish? Low Impact Development!

The Sammamish City Council is reviewing a proposed ordinance that will encourage the use of Low Impact Development (LID) methods in new subdivisions, as well as institutional and commercial projects. LID is a loosely defined term; consequently, many people do not understand what the proposed ordinance entails and what community benefits are expected if it is passed.

Currently, new development proposals typically collect rain water into a centralized pond, which discharges the water over time. Unfortunately, most pond designs allow for minimal absorption of the water into the ground, and the discharged water can increase erosion below the outlet, which may result in environmental impacts to downstream lakes and wetlands.

The Sammamish LID ordinance is designed to encourage development proposals that mimic hydrological conditions present before the development. Comprehensive LID emphasizes conservation and use of existing natural site characteristics as part of the plan. Some features of this approach include minimizing surface water runoff, maximizing tree and vegetation retention, and reducing soil disturbance or removal. By encouraging such actions, the LID ordinance will support retention


of natural soils and vegetation. This should result in slower discharge of rain water, decrease in erosion and suspended sediments, and increased evapo-transpiration by mature trees and other plants onsite. In summary, the proposed LID ordinance should promote reductions in rain water quickly flowing from developed sites.

In practice, a new subdivision proposing to use the City's LID ordinance would provide for: (a) retention of 50% of the site area in permanent open space; (b) use of pervious concretes (e.g. concretes that allow water to pass through to soil beneath); (c) absorption of surface water directly into the ground through infiltration systems (similar in concept to septic drain fields), and; (d) reduced impervious surfaces (e.g. roadway widths, driveways, etc.). Specific design features are reviewed on a site by site basis and are only incorporated where functional and appropriate. These new regulations will not supercede or interfere with current requirements for water




Analysis

The last samples of the 2007-2008 season were collected in mid-May, and the data suggest continued stability for the water quality parameters monitored. The charts show seasonal averages for the period from December through March, excluding early and late season dates when low water flows may skew results. Average values for total phosphorus (TP) and pH show some variation between years, but do not indicate a rising or falling trend.

Alkalinity at BLtri1, which leads to the north basin, has remained relatively stable through the years – likely a result of the proximity of the bog to the lake, as well as the lack of development impacts to date on the bog ecosystem. Alkalinity at BLtri2, however, continues to show signs of an upward trend. This may be the result of recent development in the watershed, since activities associated with land development such as overturning soil horizons and adding new concrete can leach minerals and increase alkalinity in surface waters. There have been no recognizable effects to date in Big Beaver Lake due to rising alkalinity values, but this will continue to be monitored closely. 

quality treatments accompanying development in watersheds of designated sensitive lakes within city boundaries.

To encourage the use of the LID ordinance, the City Council is considering incentives such as the allowance of narrower roads within subdivisions, public recognition of developers that successfully use the LID ordinance, additional lots (in some cases), and increased building heights.

For more information, please contact Evan Maxim at the City of Sammamish at 425-295-0523. 



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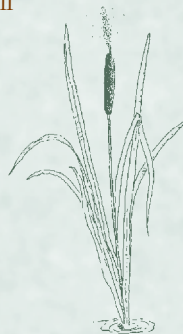
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native and which are introduced is very important before beginning any control work.

Fragrant waterlily (*Nymphaea odorata*) in a non-native species introduced from the east coast of North America because of its pretty pink and white flowers. Unfortunately, in this area it can multiply to cover the entire shallow zone of some lakes, blocking out the native yellow waterlily, and interfering with boating, fishing and swimming. Spearheaded by the Beaver Lake Community Club, efforts to control the fragrant waterlilies in Beaver Lake have begun in the last several years.

When 36 lakes were surveyed for aquatic plant life in King County in the mid 1990s, over 60 different species of aquatic plants were identified living in the fresh waters of the region. Twenty-nine of these were found in Beaver Lake, ranging from shoreline emergent vegetation to deeply submerged plants. A repeat survey is currently planned for the lake this summer to look for changes since that effort. Results and recommendations will be reported through the Beaver Lake Monitor and posted on the City of Sammamish Web site. ✂



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