The Beaver Lake Monitor

A publication of the Beaver Lake Management District Advisory Board

http://www.ci.sammamish.wa.us/BLMD.aspx#Home Volume 8, Issue 2 December 2007

The Bog that protects Beaver Lake

Q What's shaped like a strawberry, feels squishy underfoot, and is invaluable to water quality in Beaver Lake?

A The bog just north of Little Beaver Lake

That's right, a bog in your own backyard! The official name for the bog is East Lake Sammamish Wetland #21 (ELS-21). Although you may not see this hidden treasure from the road, it plays a vital role in preserving water quality in Beaver Lake.

A bog is a particular type of wetland in which organic matter accumulates faster than it decomposes. Bogs are often characterized by luxuriant growth of mosses and lichens, which can dominate the plant community. In particular sphagnum moss, which is sometimes sold commercially as "peat moss," is a common plant found in bogs and is often the dominant species.

It decomposes very slowly, so over the years a layer of spongy, thick living moss over dead moss accumulates. This leads a soft, spongy texture on the bog surface and thick deposits below. Although they grow very slowly over time, some of these peat deposits have reached a thickness of as much as 10 feet since the last glaciation. However, many of the wetlands in our area have been mined for their peat moss, leaving the few remaining bogs as rare, at-risk ecosystems.

Due to the abundance of sphagnum and partially decomposed organic material, bogs are often very acidic. Most of the water found in bogs comes from direct precipitation or a small amount of intermittent flow during storms. This type of highly acidic, nutrient poor environment is only habitable to a relatively few wetland plants, many of which are found only in these conditions. Common bog plants include Labrador tea, bog laurel, bog rosemary, black crowberry, sphagnum and other mosses, many species of sedge (*Carex*), and occasionally a few trees such as bog birch, spruce and red cedar.

Labrador Tea in ELS-21

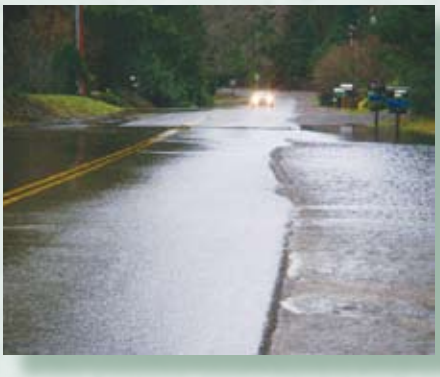
ELS-21 acts like a huge sponge upstream from Little Beaver Lake (Beaver-1). Even in the largest rainstorms, when muddy water in the other main tributary that empties into Big Beaver Lake flows out of the channel and across the road, the flow from the bog to Little Beaver Lake is still relatively clear, with a much lower rate of flow. The bog both moderates the flow peak and "filters" the water, protecting the lake from the effects of direct storm runoff.

The water flowing from the bog has been regularly monitored since just before inception of the first Beaver Lake Management District (BLMD) in 1995. Measurements of water quality have remained stable through the years, suggesting that so far the bog has continued to perform its valuable functions in protecting water quality and has not experienced major impacts from development to date. Continued vigilance is important to make sure this continues far into the future.

However, it has been more than a decade since a comprehensive survey was completed at the bog. Homes have been built to the north and east of the bog, and more are in the planning and permitting stages. Stormwater controls built to the current regulations have and will accompany development, but stormwater will discharge to facilities sited very close to the buffers and it will reach the bog. The BLMD will consider adding increased monitoring as the area in the north part of the watershed continues to be developed.

Some information in this article was obtained from US EPA and Washington DOE Web sites:
http://www.epa.gov/owow/wetlands/types/bog.html
http://www.ecy.wa.gov/biblio/0406025.html.

Water Quality Update



Water flows over the road near the tributary to Big Beaver Lake on Dec 3.

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

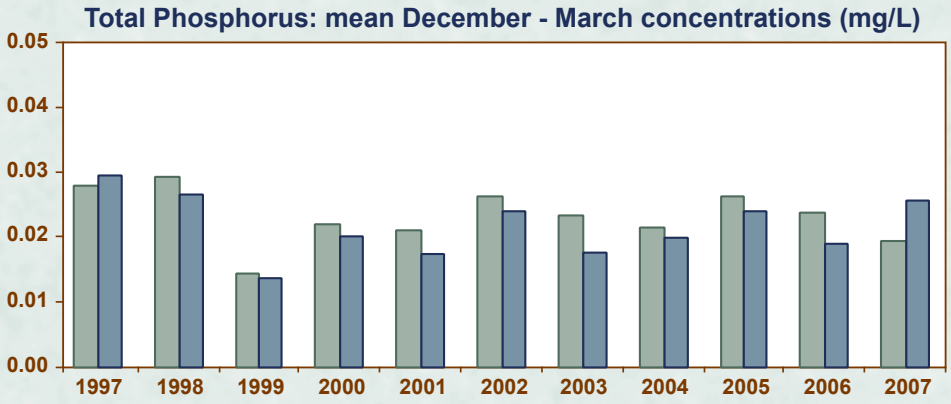
Although a variety of measurements are important in determining overall water quality, two parameters are of particular interest to the BLMD: phosphorus and alkalinity. This is because changes in these parameters are often associated with increased development.

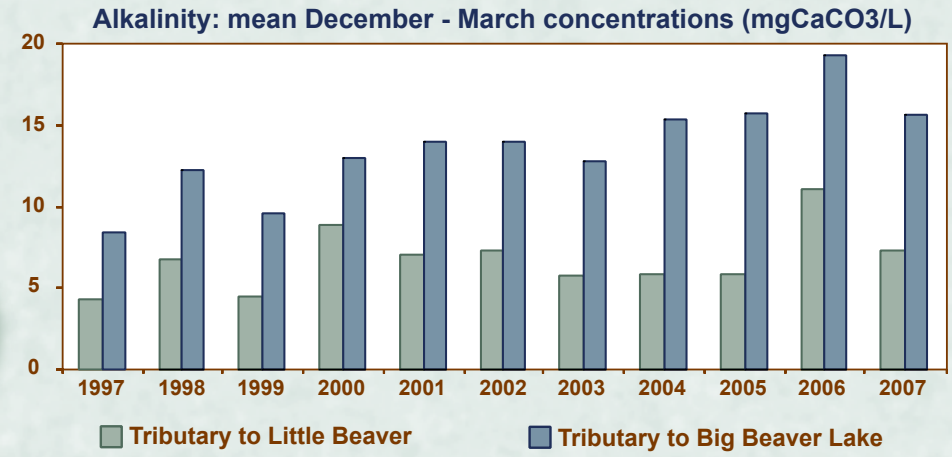
PHOSPHORUS is a naturally occurring element and is necessary in small amounts for both plants and animals. However, many actions associated with residential development can increase concentrations beyond natural levels. High phosphorus concentrations can lead to more frequent and dense algae blooms – 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 in milligrams of calcium carbonate per liter). Alkalinity often increases with new development, both as a result of new 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, slightly acidic waters of Beaver Lake. However, few studies have documented such changes and little is known about possible outcomes.

OTHER MEASUREMENTS INCLUDE:

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



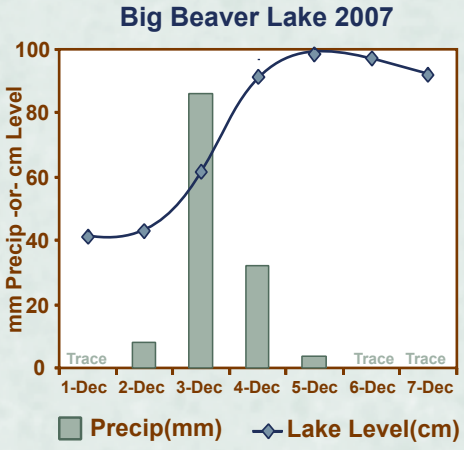


Analysis

Generally speaking water quality parameters measured have remained stable through the monitoring period, and water quality in the tributaries remains good. There appears to be a slightly upward trend in alkalinity in the tributary to Big Beaver Lake, which will continue to be watched.

Storm Sampling

Storm samples were collected from the tributaries to each lake on December 3, 2007. Monitoring storms is important because high water flows during storms contribute nutrients and sediments at a much greater rate than during normal flows. Water quality analysis results are not available yet, but BLMD board member Ray Petit recorded precipitation and lake level at his dock on Big Beaver Lake. The lake level rose 57.5 cm (almost 23 inches) in response to 130mm (more than 5 inches!) of rainfall from December 2 through December 5.



What Are Those Big Boxes?

King County staff set up the sampling box at the tributary to Little Beaver Lake.

If you regularly drive around the north end of Beaver Lake Drive, you may have noticed two large boxes along the road, one at each of the regularly monitored tributary streams. These boxes contain several pieces of automated water sampling equipment that will be able to collect multiple water samples automatically during major rainstorms.

Water flowing into Big and Little Beaver Lakes during rainstorms plays an important role in the water quality of the lakes. Under the direction of the BLMD advisory board, King County has installed the automated water sampling equipment to gain a better understanding of nutrient loads entering the lake during a complete storm cycle, especially phosphorus.

Previous to this, a normal storm sampling routine involved collecting two "grab" samples and mixing them together before analysis. Due to work schedules, these samples are usually collected sometime between early morning and dinner-time, never in the middle of the night. But rainstorms don't always coincide with the workday, and there are questions about how closely the grab samples were characterizing the storm water.

The new sampling equipment can be programmed to begin taking samples when flow increases in the stream, and to stop taking samples when flow begins to decrease. Capturing many smaller samples through the course of the storm will give a more accurate representation of total nutrient loads being added to a lake during a rain event.

The samplers in the boxes will remain in place through the winter and will probably be removed towards the end of the wet season.

If you have questions or notice anything amiss with the sampling boxes, please contact Michael Murphy at King County (contact info is on the back page).

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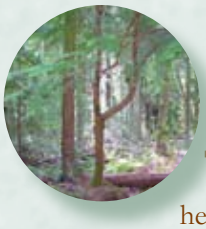

What's New in the Watershed?

News from the City of Sammamish

The Trossachs Division 14 project will be moving towards a public hearing in early 2008. The Trossachs Division 14 is the last phase of the Trossachs development currently in for review by the City, and will generate approximately 51 new single family homes located to the north of Beaver Lake. The development will be accessed primarily through the Trossachs development, and generally the new homes will be located in two distinct areas. The northern lobe of Trossachs 14 will include an extension of SE 9th Way, and will provide access to approximately 23 lots, while the southern lobe of Trossachs 14 will contain approximately 28 lots and may be accessed via SE 12th Way or 267th Place SE. The proposed development is adjacent to a large, high class wetland that drains to Beaver Lake (see the article on The Bog, this issue), and consequently the lots within the proposed development must maintain at least a 215 foot buffer from the wetland area. In addition, approximately 30 acres of the 43 acre site will remain as open space, park, or wetland and wetland buffer. To protect water quality within Beaver Lake, the proposed development will be required to meet additional water quality standards for phosphorus removal prior to allowing stormwater to leave the site.

If you have questions about this development or other general questions about land use in the Beaver Lake watershed, contact: Evan Maxim, senior planner, City of Sammamish, 425 295-0523 or emaxim@ci.sammamish.wa.us.

The Beaver Lake Monitor
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