

LAKE BEECHER

REPORT DESCRIPTION

This report is an annual update to the 2003 State of the Lakes Report and includes water quality data collected from 2003 through 2010. For additional background on the information provided here or to find out more about Lake Beecher visit www.lakes.surfacewater.info or call Snohomish County Surface Water Management at 425-388-3464.

LAKE DESCRIPTION

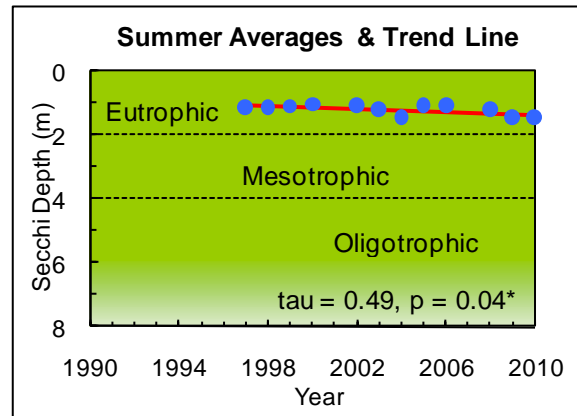
Lake Beecher is a small, shallow, oxbow lake located about 4 miles south of the City of Snohomish and just west of the Snohomish River. The lake covers 17 acres and has a maximum depth of only 3 meters. The surrounding watershed is very large—over 260 times the size of the lake—and development in the watershed continues to increase, with more homes and businesses every year.

LAKE CONDITIONS

The following graphs illustrate the summer averages and trend lines (in red) for water clarity and total phosphorus for Lake Beecher. Please refer to the table on the third page for long-term averages and for averages and ranges for individual years.

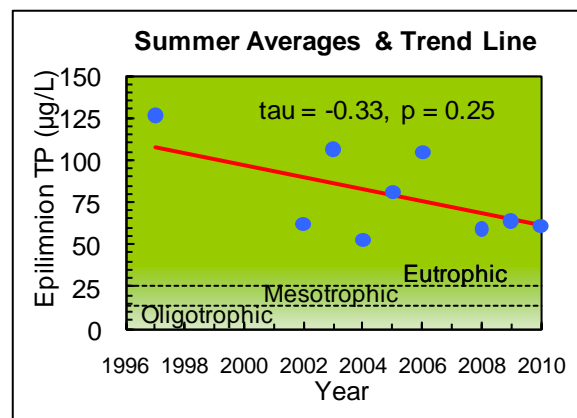
Water Clarity

Water clarity in Lake Beecher is low because of algal growth and the dark color of the water. The long-term average water clarity is 1.2 meters, with little year to year variability, partly because the maximum lake depth is only 3 meters. Water clarity in 2010 was the highest on record, averaging 1.5 meters. In fact, between 1997 and 2010, there has been a very small, but statistically significant trend toward improved water clarity in Lake Beecher.



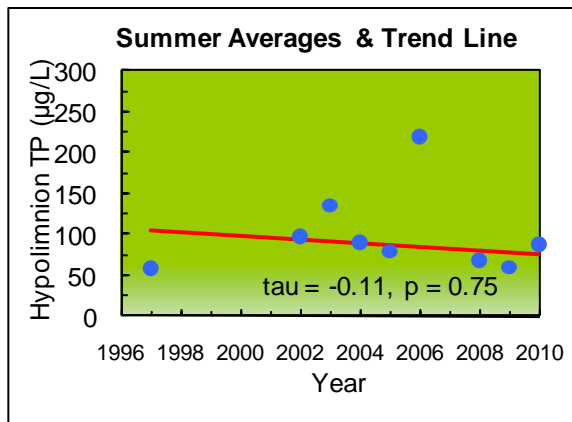
Total Phosphorus (key nutrient for algae)

Total phosphorus concentrations in the epilimnion (upper waters) are high (in the eutrophic range) and quite variable. For this reason, Lake Beecher is listed as “impaired” in Washington State’s official 2008 water quality assessment. The long-term 2002 to 2010 total phosphorus average is 80 µg/l. Individual phosphorus measurements have ranged from 27 µg/l in 2004 up to 234 µg/l in 2003. The high, variable phosphorus values in the epilimnion are a result of the nutrient inputs from the large watershed surrounding Lake Beecher and because the lake is periodically inundated by floods from the Snohomish River. Weather patterns also contribute to the variability because there may be more or less mixing between the upper waters and nutrient-rich bottom waters from year to year.



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Total phosphorus averages in the hypolimnion (bottom waters) are also high and variable, with a long-term 2002 - 2010 summer average of 100 µg/l. The concentrations measured in 2006 were very high, averaging 220 µg/l. In spite of the high phosphorus levels in some samples, there is no evidence of significant trends in total phosphorus concentrations in Lake Beecher.



Algae

There are no chlorophyll *a* measurements for Lake Beecher. However, SWM staff and volunteers have observed regular algal blooms in the lake. A significant bloom of cyanobacteria, or blue-green algae, was documented in Lake Beecher in July and August of 2008. Blooms were also observed intermittently in the summer of 2009. During a bloom, the water turns bright green or blue, and the algae may look like paint floating on the water's surface. This type of bloom has the potential to be toxic and could cause serious illness in humans who drink or play in the affected waters. Therefore, lake users should avoid contact with the water and keep pets away from the lake when it is experiencing a blue-green algal bloom.

SUMMARY

Trophic State

Lake Beecher may be classified as eutrophic based on low water clarity and high phosphorus concentrations. The lake is highly productive for both plants and algae. The eutrophic condition is likely the natural state for a shallow oxbow lake.

Condition and Trends

Targets for Lake Beecher set forth in the 2003 State of the Lakes Report are to maintain the long-term water clarity average and to avoid any increases in phosphorus levels. Water clarity has shown a small, but statistically significant, trend toward improvement, so this meets the target. Although there are no significant long-term trends in total phosphorus concentrations, it is unclear if phosphorus averages are truly stable because the values have been so variable from year to year. The phosphorus levels are higher than the standard set by Washington State for lakes in the Puget Sound basin.

Overall, Lake Beecher is at risk of declining water quality because of potential impacts from development in its very large watershed. Land cleaning and development increase the amount of nutrients that wash into the lake during rain events. The main external sources of nutrients are yard or garden fertilizers, pet wastes, runoff from roofs, patios, and driveways, and erosion from land clearing or construction. Phosphorus may also directly enter the lake through poorly maintained septic systems. Maintaining buffers of vegetation around the shoreline is important in filtering nutrients before they reach the lake. To find out more about ways to protect lake water quality and for information on the causes and problems of elevated lake nutrient levels visit www.lakes.surfacewater.info.

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| DATA SUMMARY FOR LAKE BEECHER | | | | |
|-------------------------------|--------|--|---------------------------------|----------------------------------|
| Source | Date | Water Clarity (Secchi depth in meters) | Total Phosphorus (ug/l) | |
| | | | Surface | Bottom |
| Sumioka and Dion, 1985 | 7/6/81 | 1.2 | 60 | 90 |
| SWM Staff or Volunteer | 1997 | 1.0 - 1.3 (1.1) n = 10 | 126 | 58 |
| Volunteer | 1998 | 1.0 - 1.4 (1.1) n = 4 | - | - |
| Volunteer | 1999 | 1.1 | - | - |
| Volunteer | 2000 | 0.8 - 1.3 (1.0) n = 3 | - | - |
| SWM Staff or Volunteer | 2002 | 0.8 - 1.3 (1.1) n = 4 | 46 - 71 (62) n = 4 | 67 - 127 (98) n = 4 |
| Volunteer | 2003 | 1.1 - 1.3 (1.2) n = 4 | 49 - 234 (107) n = 4 | 50 - 266 (136) n = 4 |
| Volunteer | 2004 | 1.2 - 1.8 (1.4) n = 3 | 27 - 90 (53) n = 3 | 40 - 151 (90) n = 3 |
| Volunteer | 2005 | 0.8 - 1.3 (1.1) n = 2 | 73 - 89 (81) n = 2 | 79 |
| Volunteer | 2006 | 1.0 - 1.1 (1.1) n = 2 | 53 - 156 (105) n = 2 | 189 - 250 (220) n = 2 |
| SWM Staff or Volunteer | 2008 | 1.0 - 1.7 (1.2) n = 9 | 42 - 74 (59) n = 3 | 60 - 77 (69) n = 2 |
| SWM Staff or Volunteer | 2009 | 1.3 - 1.7 (1.4) n = 8 | 34 - 111 (64) n = 4 | 47 - 70 (60) n = 4 |
| SWM Staff or Volunteer | 2010 | 1.1 - 1.9 (1.5) n = 12 | 52 - 77 (61) n = 4 | 53 - 153 (88) n = 3 |
| Long Term Avg | | 1.2 (1997-2010) | 80 (2002-2010) | 100 (2002-2010) |
| TRENDS | | Increasing | None | None |

NOTES

- Table includes summer (May-Oct) data only.
- Each box shows the range on top, followed by summer average in () and number of samples (n).
- "Surface" samples are from 1 meter depth and "bottom" samples are from 1 meter above the bottom.