

ECHO LAKE

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 2009. For additional background on the information provided here or to find out more about Echo Lake visit www.lakes.surfacewater.info or call Snohomish County Surface Water Management (SWM) at 425-388-3464.

LAKE DESCRIPTION

Echo Lake is a 21.5 acre lake located about four miles southeast of Maltby. It is spring-fed, and the outlet drains west to Bear Creek. Echo Lake is relatively deep for its size, with a maximum depth of 15 meters and a mean depth of 5.2 meters.

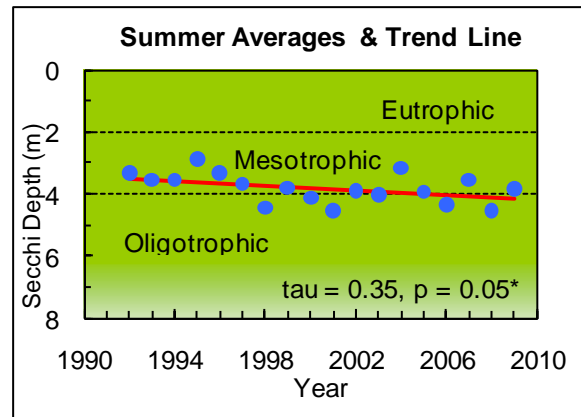
The lake watershed, the land area draining to the lake, is relatively small—only 7 times the size of the lake. This should mean that there is less potential for watershed pollution to affect the lake. However, Echo Lake is located in one of the fastest growing areas in the county. Therefore, the water quality impacts from future growth are a potential concern for Echo Lake.

LAKE CONDITIONS

The following graphs illustrate the summer averages and trend lines (in red) for water clarity, total phosphorus, and chlorophyll for Echo Lake. Please refer to the table at the end of this report for long-term averages and for averages and ranges for individual years.

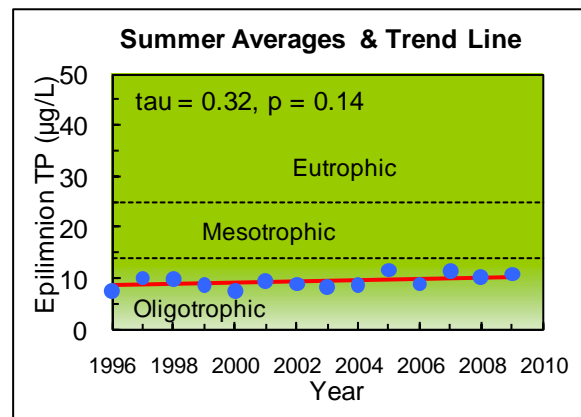
Water Clarity

The water clarity in Echo Lake is moderate and variable, with a long-term summer average of 3.8 meters. Between 1992 and 2009, there has been a small but statistically significant trend toward improving water clarity in the lake. However, the amount of long-term improvement is less than the year-to-year variability in the summer averages, so it is difficult to know if water clarity is truly getting better.



Total Phosphorus (key nutrient for algae)

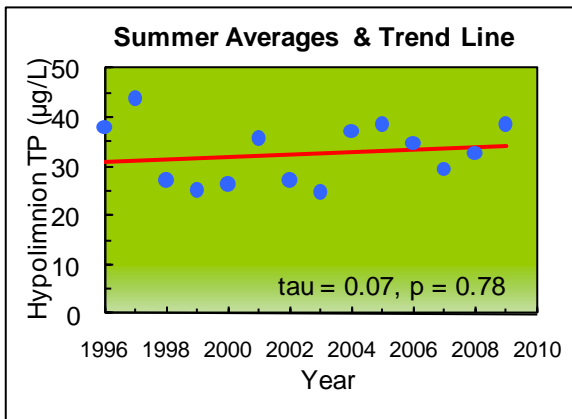
Total phosphorus concentrations in the epilimnion (upper waters) are low. The 1996 – 2009 long-term summer average for phosphorus is 10 µg/l. Although there has been low variability in phosphorus levels over this time period, it appears that phosphorus concentrations may be slightly increasing with time. However, there is not a statistically significant trend toward higher phosphorus at this point.



Phosphorus values in the hypolimnion (bottom waters) are higher and more variable than in the epilimnion. The long-term summer average is 33 µg/l. Summer phosphorus averages have ranged from 25 µg/l in 1999 and 2003 to 44 µg/l in 1997. There is no statistical evidence of any significant trends, either up or down, in total phosphorus

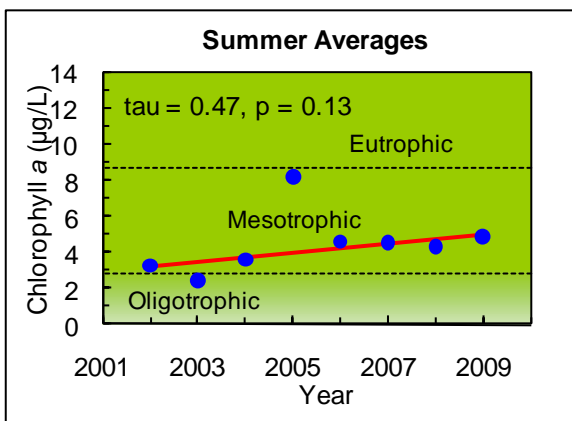
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values in the bottom waters from 1996 to 2009. Increases in phosphorus concentrations in the bottom waters would indicate a build-up of nutrients in the bottom sediments that might be a sign of accelerating eutrophication.



Chlorophyll a (Algae)

Chlorophyll a values showed moderate algal levels in Echo Lake in the summers of 2002-2009. The long-term summer average over these years is 4.5 µg/l. The average for 2005 was substantially higher, mainly because of one very high measurement in September taken during a dense algal bloom. The chlorophyll a levels do appear to be gradually increasing over the sampling period. However, this trend is not yet statistically significant. More sampling is needed to determine if chlorophyll a levels are increasing in Echo Lake.



SHORELINE CONDITION

The Echo Lake shoreline was surveyed in 2009 (see map on page 4). The lake shoreline condition is important in understanding the overall lake health. Frequently, lake shorelines are modified through removal of natural vegetation, the installation of bulkheads or other hardening structures, and/or removal of partially submerged logs and branches. These types of alterations can be harmful to the lake ecosystem because natural shorelines protect the lake from harmful pollution, prevent bank erosion, and provide important habitat for fish and wildlife.

The Echo Lake shoreline is moderately developed with residential uses. There were 29 homes or cabins around the lake in 1973. By the mid-90s, there were 44 homes bordering the lake. Although homes were not surveyed in 2009, there were 37 docks counted. Fortunately, there have been limited structural modifications to the shoreline. Only 33% of the shoreline has been modified with bulkheads, rock or log revetments, or fill. However, a large majority (87%) of the native vegetation immediately adjacent to the shoreline is no longer intact. In most cases, the native vegetation has been replaced by lawns down to the water. Lawns can be a source of nutrients and do not protect the lake as well as a buffer of native vegetation. Also, there are only a few pieces of large wood (about 10) still remaining in the lake. These old logs and branches are valuable for fish and wildlife habitat.

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SUMMARY

Trophic State

Based on moderate water clarity, low to moderate phosphorus, and moderate chlorophyll *a* concentrations, Echo Lake may be classified as mesotrophic.

Condition and Trends

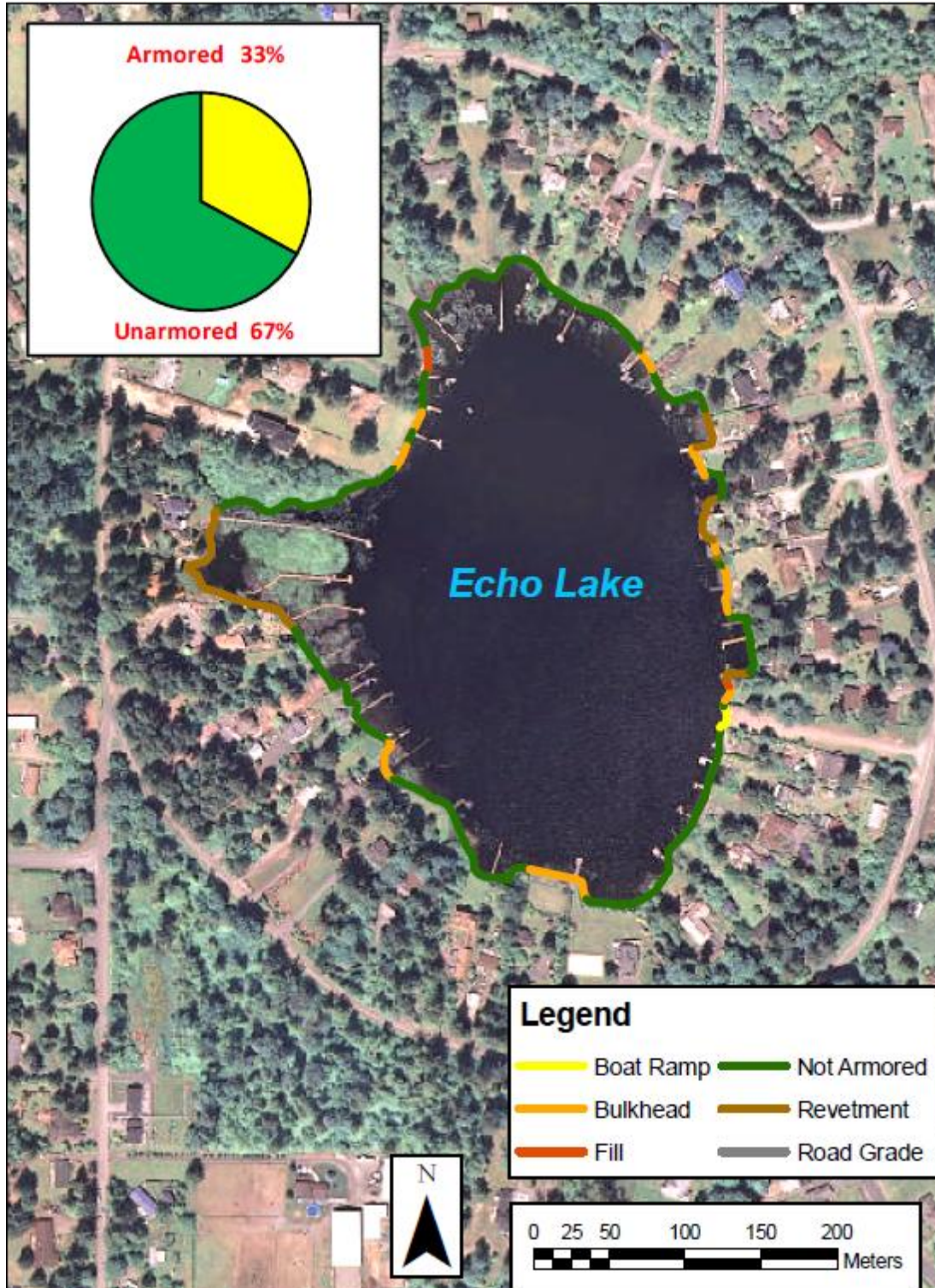
Overall, Echo Lake is in satisfactory condition. The lake is close to the water quality targets established in the 2003 State of the Lakes Report. The targets called for maintaining stable water clarity and total phosphorus levels. For water clarity, the long-term average has increased from 3.7 meters to 3.8 meters, and there is a statistically significant trend toward improving water clarity.

However, the long-term averages for total phosphorus have increased slightly from 9 µg/l to 10 µg/l in the upper waters and from 32 µg/l to 33 µg/l in the bottom waters. There are no statistically significant trends in the phosphorus levels, but these slight increases raise concerns.

For this reason, Echo Lake is considered at risk of future water quality declines. The primary threat to maintaining good water quality in the lake is the possibility of increases in nutrients from future development and from other human activities in the watershed. In order to protect the condition of the lake, measures to control nutrients in the watershed should be taken. Nutrients enter the lake through water runoff or streams flowing into the lake. Sources of nutrients include fertilizers, pet wastes, and erosion from construction and land clearing. Nutrients may also directly enter the lake through poorly maintained septic systems. To find out more about the causes and problems of elevated lake nutrient levels and tips to improve lake water quality visit www.lakes.surfacewater.info.

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2009 Shoreline Survey Results



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DATA SUMMARY FOR ECHO LAKE					
Source	Date	Water Clarity (Secchi depth in meters)	Total Phosphorus (ug/l)		Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion
Menasveta, 1961	7/59	2.9	-	-	-
Bortleson, et al, 1976	8/3/73	2.1	15	31	-
Volunteer	1992	2.8 - 3.8 (3.3) n = 8	-	-	-
Volunteer	1993	2.3 - 4.8 (3.6) n = 12	-	-	-
SWM Staff or Volunteer	1994	2.6 - 4.6 (3.6) n = 12	-	-	2.4 - 5.9 (4.2) n = 2
SWM Staff or Volunteer	1995	2.2 - 3.4 (2.9) n = 8	-	-	9.9
Volunteer	1996	3.1 - 3.7 (3.3) n = 3	6 - 9 (8) n = 2	36 - 40 (38) n = 2	-
SWM Staff or Volunteer	1997	2.6 - 5.2 (3.7) n = 8	10 (10) n = 2	30 - 58 (44) n = 2	-
SWM Staff or Volunteer	1998	3.2 - 5.3 (4.5) n = 7	7 - 13 (10) n = 4	21 - 40 (27) n = 4	-
SWM Staff or Volunteer	1999	3.5 - 4.0 (3.8) n = 4	7 - 9 (9) n = 4	24 - 26 (25) n = 4	-
SWM Staff	2000	3.9 - 4.3 (4.1) n = 3	7 - 8 (7) n = 3	21 - 32 (26) n = 3	-
SWM Staff	2001	3.8 - 5.5 (4.6) n = 4	7 - 13 (10) n = 4	31 - 41 (36) n = 4	-
SWM Staff	2002	3.2 - 5.0 (3.9) n = 4	7 - 11 (9) n = 4	24 - 32 (27) n = 4	1.3 - 4.8 (3.3) n = 4
SWM Staff	2003	3.5 - 5.4 (4.0) n = 4	8 - 9 (8) n = 4	23 - 28 (25) n = 4	0.8 - 5.3 (2.5) n = 4
Volunteer	2004	2.6 - 4.9 (3.2) n = 8	7 - 10 (9) n = 4	27 - 50 (37) n = 4	1.9 - 4.8 (3.6) n = 4

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DATA SUMMARY FOR ECHO LAKE					
Source	Date	Water Clarity (Secchi depth in meters)	Total Phosphorus (ug/l)		Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion
Volunteer	2005	2.8 - 5.1 (3.9) <i>n</i> = 7	10 - 13 (12) <i>n</i> = 4	23 - 59 (39) <i>n</i> = 4	3.7 - 20 (8.3) ^a <i>n</i> = 4
SWM Staff or Volunteer	2006	3.7 - 52 (4.4) <i>n</i> = 9	7 - 10 (9) <i>n</i> = 4	31 - 37 (35) <i>n</i> = 4	3.5 - 6.4 (4.6) <i>n</i> = 4
SWM Staff or Volunteer	2007	3.1 - 4.0 (3.5) <i>n</i> = 5	9 - 15 (11) <i>n</i> = 4	21 - 36 (30) <i>n</i> = 4	3.2 - 6.4 (4.6) <i>n</i> = 4
SWM Staff or Volunteer	2008	3.5 - 6.0 (4.6) <i>n</i> = 6	8 - 11 (10) <i>n</i> = 4	22 - 45 (33) <i>n</i> = 4	1.9 - 11 (4.4) <i>n</i> = 4
SWM Staff or Volunteer	2009	3.4 - 4.4 (3.8) <i>n</i> = 4	9 - 13 (11) <i>n</i> = 4	30 - 50 (39) <i>n</i> = 4	2.4 - 8.8 (4.9) <i>n</i> = 4
Long Term Avg		3.8 (1992-2009)	10 (1996-2009)	33 (1996-2009)	4.5 (2002-2009)
TRENDS		Increasing	None	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*).
- Total phosphorus data are from samples taken at discrete depths only.
- "Surface" samples are from 1 meter depth and "bottom" samples are from 1-2 meters above the bottom.

^a Average is influenced by one high value.