

LAKE KAYAK

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 Kayak visit www.lakes.surfacewater.info or call Snohomish County Surface Water Management (SWM) at 425-388-3464.

LAKE DESCRIPTION

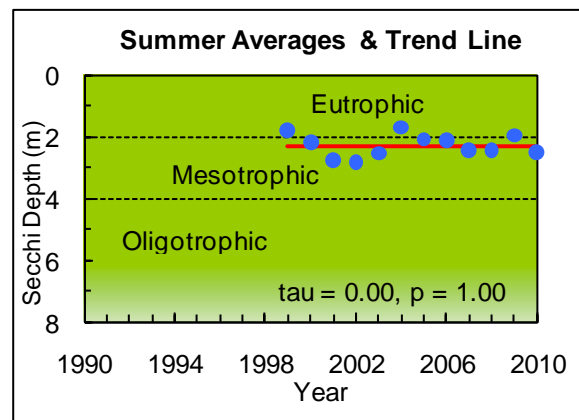
Lake Kayak is a small, 15-acre lake located on a plateau approximately five miles southeast of the City of Monroe. The lake is partially man-made. An earthen dam maintains the lake at its current level. The 2003 bathymetric map indicates that the maximum depth of the lake is 21.8 feet (6.6 meters). The Lake Kayak watershed is mostly forested and is one of the least developed lake watersheds in Snohomish County.

LAKE CONDITIONS

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

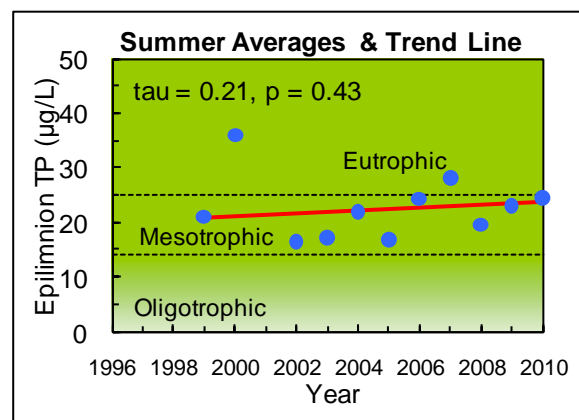
Water Clarity

Overall, water clarity in Lake Kayak is low to moderate. The long-term 1999 to 2010 summer average is 2.3 meters. Although water clarity has been highly variable, there are no statistically significant trends in water clarity in Lake Kayak.



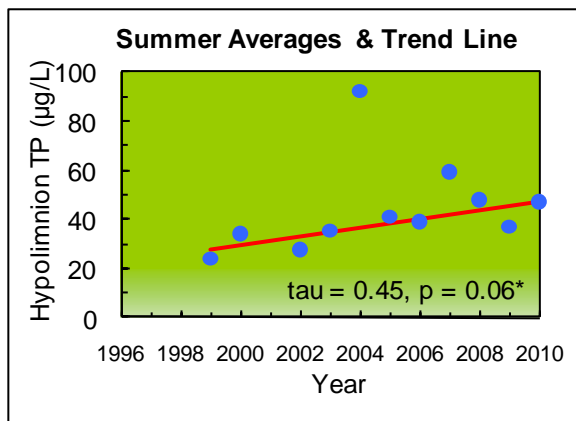
Total Phosphorus (key nutrient for algae)

Total phosphorus concentrations in the epilimnion (upper waters) are moderate to high, with a 1999 - 2010 long-term summer average of 23 µg/l. There is no evidence of a statistically significant trend toward increasing phosphorus in spite of a lot of variability in averages from year to year. However, the State of Washington lists Lake Kayak as “impaired” in its official 2008 water quality assessment because phosphorus levels are higher than for most lakes.



LAKE KAYAK

Total phosphorus levels in the hypolimnion (bottom waters) are higher. The 1999 – 2010 long-term summer average is 44 µg/l. Phosphorus concentrations were quite high in 2004 at 92 µg/l and in 2007 at 60 µg/l. Despite considerable variation in yearly averages, overall there is a statistically significant trend toward increasing phosphorus levels in the bottom waters. Higher levels may be a sign of accelerating eutrophication that may lead to more algae in the future. This is somewhat typical of reservoir lakes because they tend to become enriched with nutrients, algae, and aquatic plants faster than natural lakes. The increasing statistical trend should be viewed cautiously, however, because of the short monitoring record and because of limited measurements in 1999 and 2000.



Chlorophyll a (Algae)

Chlorophyll *a* samples were collected from Lake Kayak for the first time in 2010. Chlorophyll *a* is a measure of algal growth in the lake. The monitoring revealed high levels of algae compared to other lakes, with a 2010 summer average of 23 µg/l. Through the years, residents have reported occasional thick growths of algae, called blooms. Blooms of blue-green algae often look like blue or green paint floating on the surface. Blue-green algae, also called cyanobacteria, are a type of algae capable of producing toxins during blooms. The toxins can cause serious illness in people and pets that come into contact with affected water. Lake users should

avoid contact with the water and keep pets away from the lake when it is experiencing a blue-green algal bloom. In July 2009, a resident reported a blue-green bloom, and SWM staff tested the bloom for toxins. However, the bloom had largely dissipated and no toxins were detected.

Aquatic Plants

There are moderate levels of aquatic plants in Lake Kayak, except along the shallow, outlet arm of the lake where aquatic plants are much denser.

Lake Levels and Beavers

There have been several beaver dams in the Lake Kayak watershed and at least one beaver dam in the lake in recent years. Beaver dams upstream of the lake have failed catastrophically on more than one occasion, bringing large amounts of sediment and debris into the lake and, in one instance, washing out a County road. Residents installed piping to bypass a beaver dam in the lake outlet arm several years ago, and on-going maintenance has been required to prevent this beaver dam from raising the lake level too high and threatening the integrity of the earthen dam.

SUMMARY

Trophic State

Lake Kayak may be classified as meso-eutrophic based on low to moderate water clarity, moderate to high phosphorus concentrations, and high algae levels. The lake is moderately productive of plants and algae, which is the expected condition for this man-made lake.

Condition and Trends

Lake Kayak appears to be in satisfactory condition for a small, impounded lake. There are no evident trends in water clarity or in phosphorus levels in the upper waters. However, there is a trend toward increasing phosphorus in the bottom waters. If this trend continues, the lake may produce even more algae than it does currently.

LAKE KAYAK

Lake Kayak may be at risk of future water quality declines because of the increasing phosphorus in the bottom waters and because there is potential for significant development in the watershed that could bring more nutrients into the lake through storm runoff. Impounded lakes also tend to become eutrophic (increasing plants and algae and filling with sediment) more quickly than natural lakes. The increased phosphorus in the hypolimnion raises concerns about accelerating eutrophication.

The primary threat to lake water quality is an increase of nutrients entering the lake through new development and human activities in the watershed. Nutrients enter the lake through stormwater runoff from the watershed. 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. Measures to control nutrients in the watershed should be taken now to prevent any future negative impacts to the lake. To find out more about ways to protect lake water quality and information on the causes and problems of elevated lake nutrient levels visit www.lakes.surfacewater.info.

LAKE KAYAK

DATA SUMMARY FOR LAKE KAYAK					
Source	Date	Water Clarity (Secchi depth in meters)	Total Phosphorus (ug/l)		Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion
SWM Staff or Volunteer	1999	1.2 - 2.3 (1.8) <i>n</i> = 6	21	24	-
SWM Staff or Volunteer	2000	1.2 - 3.0 (2.2) <i>n</i> = 8	36	34	-
SWM Staff or Volunteer	2001	2.1 - 3.5 (2.8) <i>n</i> = 7	-	-	-
SWM Staff or Volunteer	2002	2.1 - 4.2 (2.9) <i>n</i> = 10	15 - 20 (17) <i>n</i> = 4	15 - 34 (28) <i>n</i> = 4	-
SWM Staff or Volunteer	2003	1.9 - 3.9 (2.5) <i>n</i> = 13	12 - 22 (17) <i>n</i> = 4	8 - 75 (35) <i>n</i> = 4	-
Volunteer	2004	1.5 - 2.3 (1.7) <i>n</i> = 7	20 - 25 (22) <i>n</i> = 4	42 - 179 (92) <i>n</i> = 4	-
Volunteer	2005	1.8 - 2.4 (2.1) <i>n</i> = 3	13 - 20 (17) <i>n</i> = 4	19 - 68 (41) <i>n</i> = 4	-
SWM Staff or Volunteer	2006	1.8 - 2.5 (2.1) <i>n</i> = 6	12 - 41 (24) <i>n</i> = 4	15 - 88 (39) <i>n</i> = 4	-
SWM Staff or Volunteer	2007	1.9 - 4.0 (2.5) <i>n</i> = 5	21 - 39 (28) <i>n</i> = 4	34 - 82 (60) <i>n</i> = 4	-
Volunteer	2008	2.0 - 2.8 (2.5) <i>n</i> = 4	18 - 22 (20) <i>n</i> = 4	23 - 71 (48) <i>n</i> = 4	-
SWM Staff or Volunteer	2009	1.3 - 2.8 (2.0) <i>n</i> = 6	14 - 33 (23) <i>n</i> = 4	22 - 45 (37) <i>n</i> = 4	-
SWM Staff or Volunteer	2010	2.0 - 3.3 (2.5) <i>n</i> = 6	20 - 28 (24) <i>n</i> = 4	16 - 86 (47) <i>n</i> = 4	13 - 35 (23) <i>n</i> = 3
Long Term Avg		2.3 (1999-2010)	23 (1999-2010)	44 (1999-2010)	NA
TRENDS		None	None	Increasing	None

- 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.