

## RUGGS 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 2010. For additional background on the information provided here or to find out more about Ruggs Lake visit [www.lakes.surfacewater.info](http://www.lakes.surfacewater.info) or call Snohomish County Surface Water Management (SWM) at 425-388-3464.

### LAKE DESCRIPTION

Ruggs Lake is an 11-acre, private access lake located just south and east of the Everett city limits. The lake is fed by the outlet stream from Silver Lake and drains into Thomas Lake and North Creek. The Ruggs Lake watershed is very large in relation to the size of the lake, which means there is a high potential to receive excess nutrients and sediment from the watershed. Most of the lake shore is developed with single family homes.

The bathymetric map developed by SWM in 2005 shows that the lake has a maximum depth of 4.6 meters (15 feet). The bathymetric map also indicates that Ruggs Lake is several feet shallower than it was in the early 1980s. This documents a problem with sedimentation that is rapidly filling in the eastern portion of the lake. The majority of the sediment appears to be coming from the decomposition of dense aquatic plants that grow in the rich sediments of the lake.

### LAKE CONDITIONS

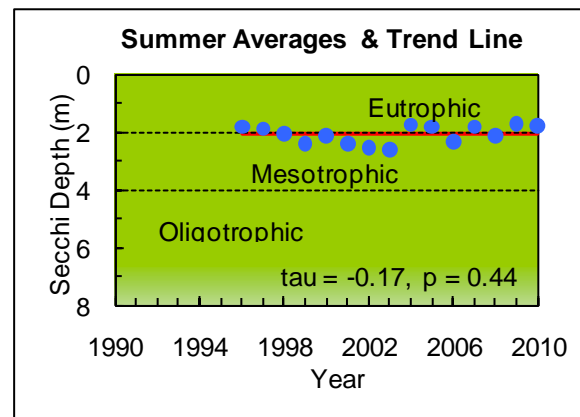
The following graphs illustrate the summer averages and trend lines (in red) for water clarity and total phosphorus for Ruggs Lake. Please refer to the table at the end of the report for long-term averages and for averages and ranges for individual years.

#### Water Clarity

Water clarity in Ruggs Lake is relatively low, with a 1996 – 2010 long-term summer average of 2.1 meters. Part of the reason for low water clarity is the naturally dark water caused by tannins from organic materials from nearby wetlands and the lake bottom. The dark

color does not affect water quality, but does reduce the clarity of the water.

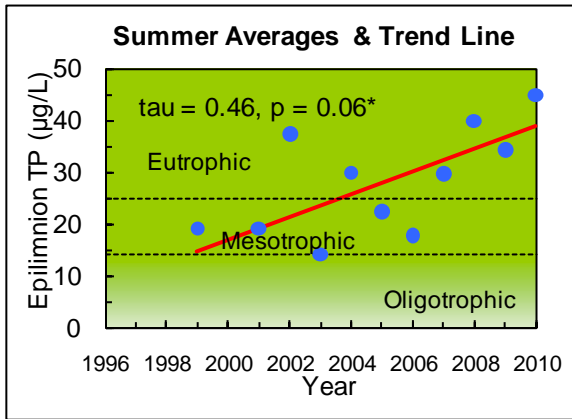
From 1996 through 2003, it appeared that water clarity averages were improving, reaching a high of 2.6 meters in 2002 and 2003. However, water clarity dropped in 2004 and continues to be near 2.0 meters. Currently, there is no evidence of a significant long-term trend in water clarity. There are occasional algal blooms, as described below, that affect water clarity. However, the frequency of algal blooms does not appear to be causing long-term changes in water clarity.



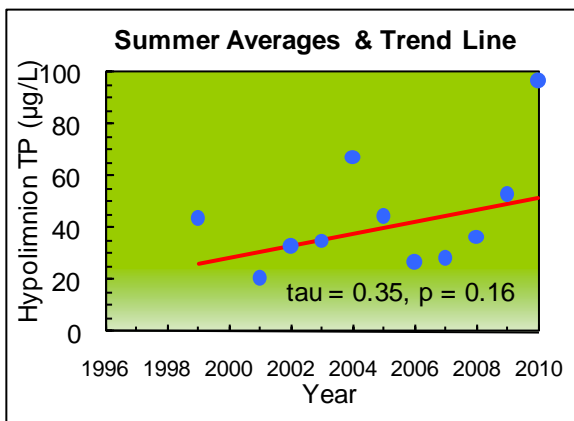
#### Total Phosphorus (key nutrient for algae)

Total phosphorus concentrations in the epilimnion (upper waters) are moderate to high and quite variable. The 1999 to 2010 long-term summer average is 28  $\mu\text{g/l}$ . The summer average for 2010 was 45  $\mu\text{g/l}$ , the highest on record. Between 1999 and 2010, there has been a statistically significant trend toward increasing phosphorus levels in the epilimnion of Ruggs Lake. More phosphorus typically results in more algae in the lake. If phosphorus levels continue to increase, higher algae levels can be expected. That would be a sign of accelerating eutrophication in the lake. High phosphorus levels are the reason that Ruggs Lake is listed as “impaired” in Washington State’s official 2008 water quality assessment.

# RUGGS LAKE



Summertime phosphorus levels in the hypolimnion (bottom waters) are moderately high and quite variable, with a long-term 1999 – 2010 average of 44 µg/l. The summer average in 2004 was substantially higher than in other years, and the 2010 average of 97 µg/l was the highest on record. Although there is not yet a statistically significant trend toward higher phosphorus levels in the hypolimnion, years with higher levels indicate a build-up of nutrients being released from the bottom sediments. Phosphorus release from the sediments occurs during periods of low dissolved oxygen in the summer and may be another sign of accelerating eutrophication.



## Chlorophyll a (Algae)

No chlorophyll a data are available for Ruggs Lake, so the levels of algae are unknown. However, water clarity responds to the amount of algae in the water. So, low water clarity, even with dark colored water, indicates at least moderate levels of algae in the lake. Also, the lake is rich in nutrients that support algal growth, and dense algal blooms have been observed in the lake from time to time.

## SHORELINE CONDITION

The shoreline condition of a lake is important in overall lake health. Frequently, lake shorelines are modified either through removal of natural vegetation and/or the installation of bulkheads or other hardening structures. These types of alterations do not protect a lake as well as more natural shorelines.

The shoreline of Ruggs Lake is mostly developed with residential uses. Fortunately, some land owners have protected or created buffers of native vegetation along the shoreline. However, others cultivate lawns down to the water's edge. Efforts to create and maintain more natural shorelines with buffers of native vegetation can reduce the sources of nutrients (such as fertilizers), can help filter out pollution before it reaches the lake, and can provide valuable habitat for fish and wildlife.

# RUGGS LAKE

## SUMMARY

### Trophic State

Based on low water clarity, moderate to high phosphorus concentrations, periodic algal blooms, and dense aquatic plant growth, Ruggs Lake may be classified as eutrophic. This means the lake is very productive of algae and plants.

### Condition and Trends

The water quality targets for Ruggs Lake set forth in the 2003 State of the Lakes Report were to improve water clarity and phosphorus levels. For a few years, it appeared that water clarity was improving, but recent measurements reveal little change in water clarity over the long run. In contrast, there is a statistically significant trend toward increasing phosphorus levels in the upper waters, and 2010 had high phosphorus concentrations in both the upper and lower waters. Therefore, the target of improving phosphorus levels has not been met. Further increases in phosphorus may lead to nuisance algal growth that affects use of the lake.

Ruggs Lake continues to need restoration. Sedimentation that is filling in the eastern portion of the lake is a major problem for lake residents. The main source of sediment appears to be the growth and decomposition of the dense aquatic plants in this area of the lake. This problem could be addressed, in part, through dredging, but the costs are too high for local residents to undertake.

Water quality could also be improved by reducing the inflow of nutrients to the lake from new development and from human activities in the watershed. Nutrients enter the lake through stormwater runoff or from streams flowing into the lake. Sources of nutrients include fertilizers, pet wastes, runoff from roofs and paved areas, and erosion from construction and land clearing. Since runoff may also carry sediment, actions to reduce or slow runoff may also help to slow the sedimentation. To find out how to protect lake water quality and to find more information on the impacts of elevated lake nutrient levels please visit [www.lakes.surfacewater.info](http://www.lakes.surfacewater.info).

## RUGGS LAKE

DATA SUMMARY FOR RUGGS LAKE				
Source	Date	Water Clarity (Secchi depth in meters)	Total Phosphorus (ug/l)	
			Surface	Bottom
Sumioka and Dion, 1985	7/1/81	2.4	10	30
Volunteer	1996	1.4 - 2.3 (1.8) n = 9	-	-
Volunteer	1997	1.0 - 3.0 (1.9) n = 10	-	-
Volunteer	1998	1.2 - 3.3 (2.1) n = 8	-	-
SWM Staff or Volunteer	1999	1.1 - 4.0 (2.4) n = 9	19	44
Volunteer	2000	1.4 - 3.5 (2.1) n = 8	-	-
SWM Staff or Volunteer	2001	1.3 - 4.1 (2.4) n = 7	19	21
SWM Staff or Volunteer	2002	1.7 - 4.1 (2.6) n = 7	14 - 58 (37) n = 4	20 - 63 (33) n = 4
SWM Staff or Volunteer	2003	1.9 - 3.2 (2.6) n = 3	14	35
SWM Staff or Volunteer	2004	1.0 - 3.0 (1.8) n = 9	11 - 52 (30) n = 4	49 - 97 (67) n = 4
SWM Staff or Volunteer	2005	1.0 - 2.8 (1.8) n = 8	13 - 44 (22) n = 4	30 - 62 (45) n = 4
SWM Staff or Volunteer	2006	1.2 - 4.4 (2.4) n = 6	13 - 22 (18) n = 3	15 - 39 (27) n = 3
SWM Staff or Volunteer	2007	1.0 - 3.2 (1.8) n = 6	13 - 53 (30) n = 4	23 - 40 (29) n = 4
SWM Staff or Volunteer	2008	1.0 - 4.1 (2.1) n = 9	11 - 99 (40) n = 4	21 - 54 (37) n = 4
SWM Staff or Volunteer	2009	1.2 - 2.8 (1.7) n = 7	13 - 52 (34) n = 4	37 - 90 (53) n = 4

## RUGGS LAKE

DATA SUMMARY FOR RUGGS LAKE				
Source	Date	Water Clarity (Secchi depth in meters)	Total Phosphorus (ug/l)	
			Surface	Bottom
SWM Staff or Volunteer	<b>2010</b>	0.9 - 2.7 (1.8) <i>n</i> = 9	14 - 92 (45) <i>n</i> = 4	54 - 169 (97) <i>n</i> = 4
<b>Long Term Avg</b>		<b>2.1</b> <b>(1996-2010)</b>	<b>28</b> <b>(1999-2010)</b>	<b>44</b> <b>(1999-2010)</b>
<b>TRENDS</b>		<b>None</b>	<b>Increasing</b>	<b>None</b>

## 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.