

Lake Rowland

Lake Rowland has low water clarity, high nutrient levels, and abundant aquatic plants and algae. Water clarity has increased in recent years; however, the lake shows some signs of increasing eutrophication. The lake may be at risk of future declines in water quality unless the surrounding wetlands are protected and nutrient runoff from the watershed is controlled.



State of the Lakes Report
March 2003

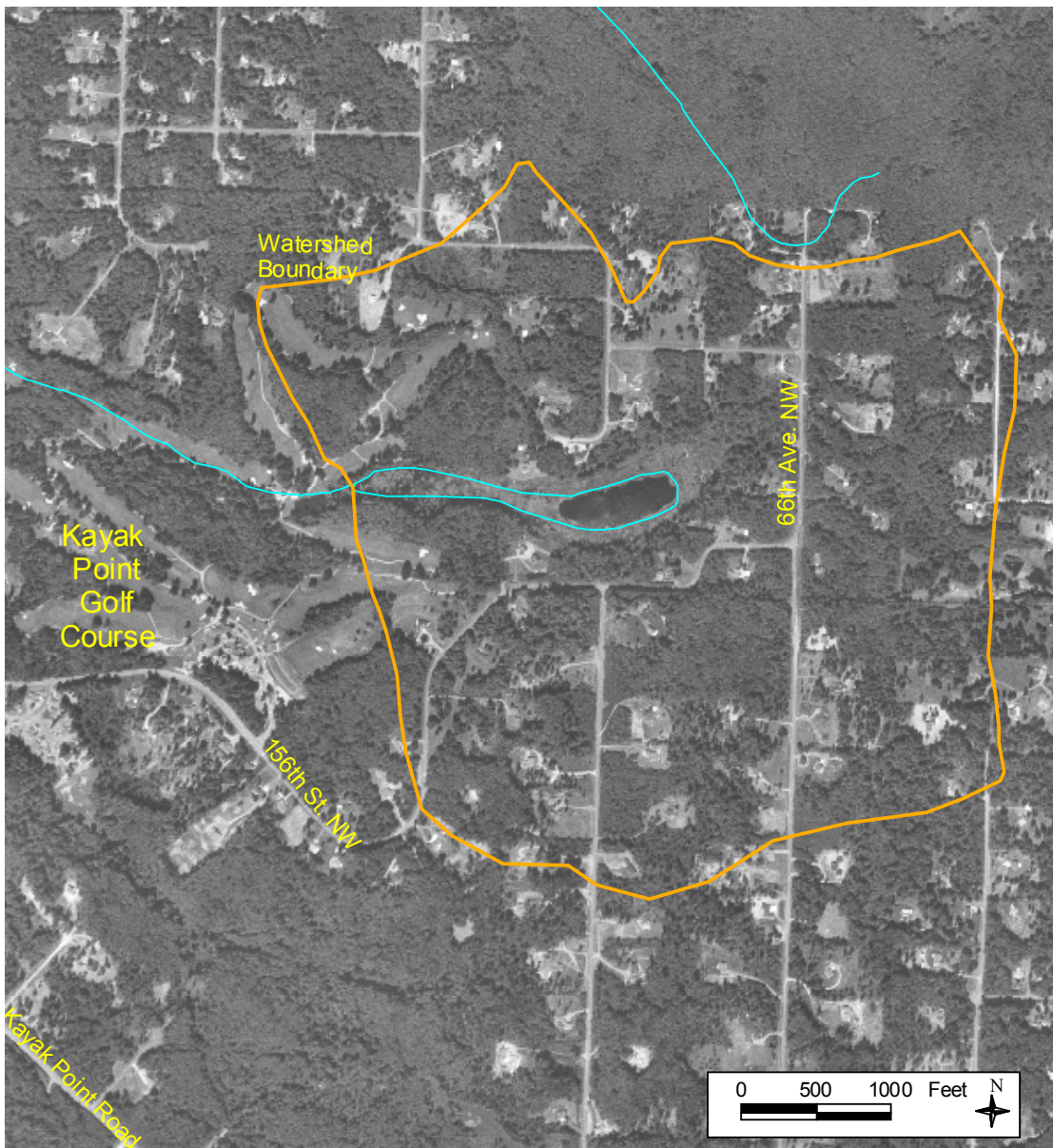
Snohomish County Public Works
Surface Water Management

LAKE AND WATERSHED DATA

Lake Area: 9 acres
 Watershed Area: 404 acres
 Watershed to Lake Area Ratio: 44.9
 Maximum Depth: 60 feet (18.3 meters)?
 Average Depth: NA
 Lake Volume: NA
 Length of Shore: 0.9 miles



	1974	Mid-90's
# of nearshore homes	0	7
# of homes/1000' of shoreline	0.0	1.5
% of homes with bulkhead or fill		0%
% of homes with some native vegetation near shore		100%
% of watershed developed (residential or commercial)	0%	20% (est.)



LAKE ASSESSMENT

DESCRIPTION

■ **Location/Access** – Lake Rowland is located approximately 1 mile west of Lake Goodwin adjacent to the Kayak Point Golf Course. Lake Rowland drains westward to Port Susan. There are no perennial streams entering the lake, so ground water is likely the main water source. Lake Rowland has no public access.

■ **Size/Shape** – The surface area of Lake Rowland covers approximately 9 acres, making it one of the smallest lakes in the County monitoring program. In *Lakes of Washington*, Wolcott (1965) reports the unverified maximum depth of the lake as 18.5 meters. However, SWM and volunteer monitors have not been able to find depths greater than 7 to 8 meters. Wetlands entirely surround the main open water portion of the lake. The western arm of the lake is quite shallow and contains many emergent aquatic plants.

■ **Watershed** – In contrast to its small surface area, Lake Rowland has a large watershed which totals 404 acres, including the lake. The ratio of the watershed to lake area is 44.9. Having a large watershed means that there is greater potential for receiving pollution and sediment from the surrounding lands than at a lake with a small watershed. Portions of the nearby Kayak Point Golf Course also drain to Lake Rowland. The limited data currently available do not identify any direct impacts from the golf course; however, the potential exists for nutrient-rich runoff from the golf course to affect the water quality of the lake. There is evidence from old photographs that portions of the lake once were farmed for blueberries or cranberries. By 1974, the farming had ended, while the watershed remained completely forested and undeveloped. Since that time, there has been steady housing construction at rural densities scattered around the watershed. By the mid-90s, residential uses covered about 20% of the watershed.

■ **Shoreline** – The shoreline of Lake Rowland is 0.9 miles long. There were no houses around the shore in 1974. By the mid-90s, there were 7 homes



on the lake—still one of the least developed lake shorelines in the county. Because of dense wetlands surrounding the lake, all of the homes are set back from the shore, and there are no bulkheads or fill. These shoreline wetlands are important for filtering pollution before it reaches the water.

LAKE CONDITIONS

■ **Water Clarity** – Water clarity in Lake Rowland is low, but gradually increased between 1994 and 2002. Summer averages improved from 1.5 to 2.3 meters over this period. Analysis shows that this increase is statistically significant. The reasons for this apparent increase in water clarity are unknown. However, photographs indicate that the amount of open water in the lake has also been gradually increasing. This may be because water levels were slightly higher in recent years, flooding out some of the surrounding wetlands. More water could also mean greater dilution of the humic color in the water, which might increase water clarity.

■ **Color** – The lake water is moderately colored by dissolved organic (humic) materials from the surrounding wetlands. This color affects water clarity. Although there have been no measurements of water color, monitors usually describe the water as light to medium brown.

■ **Nutrients** – Limited data indicate that total phosphorus concentrations are relatively high compared to other county lakes. Single samples in early summer 1998, 2000, and 2001, and four samples in summer 2002, ranged from 26 to 47

µg/l in the epilimnion. In the hypolimnion, early summer concentrations ranged from 39 to 61 µg/l in 1998, 2000, and 2001. Samples taken monthly over the entire summer of 2002 were much higher, averaging 199 µg/l. Taken together, these data suggest substantial release of nutrients from the bottom sediments during times of oxygen depletion.

■ Oxygen/Temperature – Vertical profiles of dissolved oxygen and temperature measured once each in June of 1998, 2000, and 2001 show strong stratification between the warm upper waters and cool bottom waters. Dissolved oxygen was available near the surface; but even in early summer, dissolved oxygen was depleted below 1 or 2 meters depth. The vertical profile taken in June 2002 shows low oxygen levels even near the surface. These profiles indicate the presence of large volumes of decaying organic matter in the lake bottom.

■ Algae – No data are available on algae concentrations. However, SWM and volunteer monitors regularly report moderate to heavy algae visible in the lake.

■ Aquatic Plants – The lake supports dense growths of aquatic plants. Much of the lake surface in shallow areas is covered by yellow water-lily, a native plant. Other common plants include large-leaf and thin-leaf pondweeds, as well as cattails around the lake margins.

SUMMARY

■ Trophic State – Based on low water clarity, elevated phosphorus concentrations, regular algal blooms, and high aquatic plant productivity, Lake Rowland may be classified as eutrophic.

■ Current Conditions/Trends – Lake Rowland appears to be in satisfactory condition for a eutrophic lake. Monitoring data show a statistically significant trend toward improving water clarity since 1994, perhaps because higher water levels reduce the dark color of the water. The lake shows some signs of accelerated eutrophication, however, such as severely depleted dissolved oxygen and high hypolimnetic total phosphorus levels.

Therefore, the lake may be at risk of future declines in water quality.

■ Future Concerns/Targets – The main concern for Lake Rowland is the potential for impacts from golf course runoff and from potential future development in such a large watershed. Maintaining or improving water clarity and reducing phosphorus levels are the targets for the lake.

■ Recommendations – New development in the watershed should take precautions to control runoff and reduce nutrient pollution. The golf course should be managed to limit nutrient runoff to the lake. The wetlands surrounding the lake should be protected to filter pollution and provide fish and wildlife habitat. Monitoring of the lake should continue, with focus on water clarity, nutrients, and algae. A bathymetric map and an aquatic plant survey should be completed to establish baseline conditions.

CITIZEN VOLUNTEERS

Thanks to Gerry and Vera Miller for years of volunteer monitoring at Lake Rowland.

DATA SUMMARY TABLE

Source	Date	Secchi Depth (meters)	Total Phosphorus (ug/l)		Color (Pt-Co scale)	Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion	Epilimnion
Volunteer	Summer 1994	1.0 - 1.8 (1.5) <i>n</i> = 9	-	-	-	-
Volunteer	Summer 1995	1.5 - 1.6 (1.5) <i>n</i> = 4	-	-	-	-
Volunteer	Summer 1996	1.6 - 2.3 (1.8) <i>n</i> = 6	-	-	-	-
Volunteer	Summer 1997	1.6 - 2.0 (1.7) <i>n</i> = 5	-	-	-	-
SWM Staff or Volunteer	Summer 1998	1.3 - 2.1 (1.7) <i>n</i> = 7	47	61	-	-
Volunteer	Summer 1999	1.4 - 2.2 (1.9) <i>n</i> = 5	-	-	-	-
SWM Staff or Volunteer	Summer 2000	1.8 - 2.2 (2.0) <i>n</i> = 4	30	39	-	-
SWM Staff or Volunteer	Summer 2001	1.7 - 2.1 (1.9) <i>n</i> = 4	35	53	-	-
SWM Staff or Volunteer	Summer 2002	1.9 - 2.7 (2.3) <i>n</i> = 5	26 - 39 (31) <i>n</i> = 4	73 - 253 (199) <i>n</i> = 4	-	-

NOTES

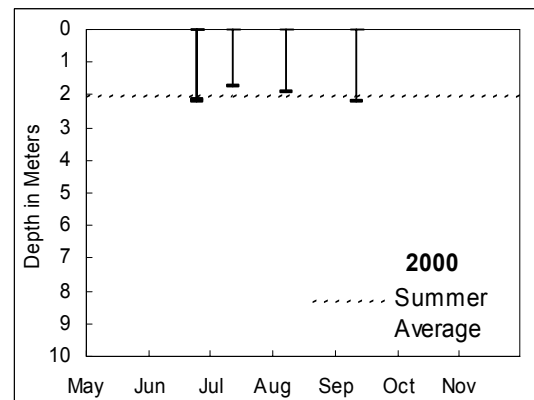
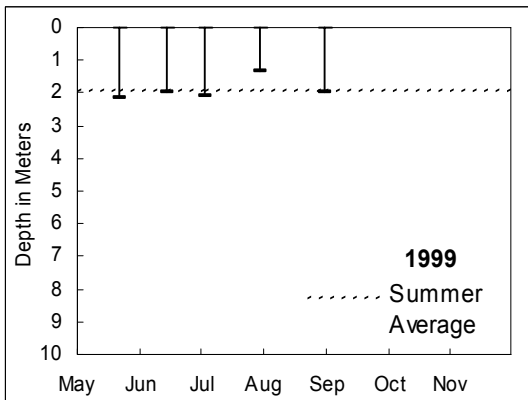
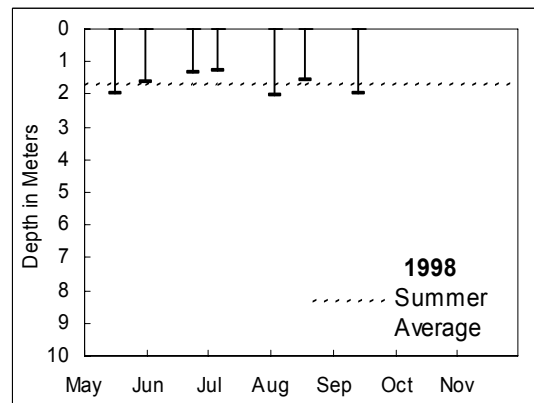
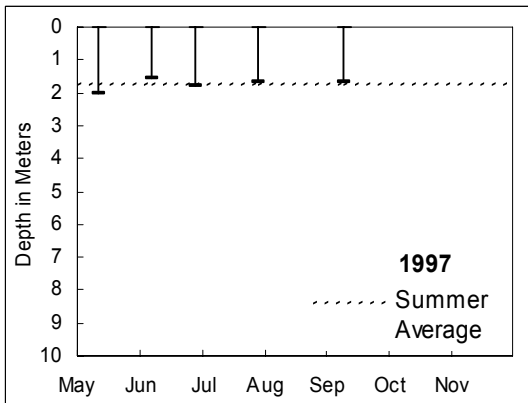
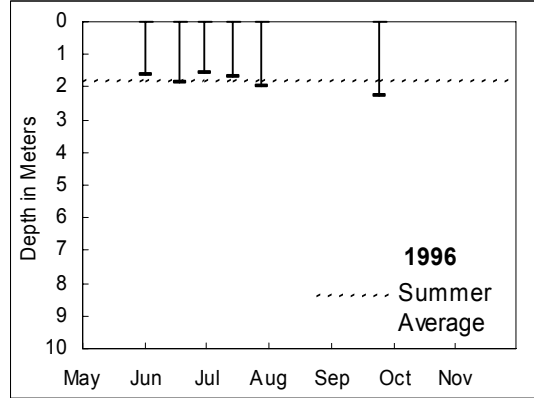
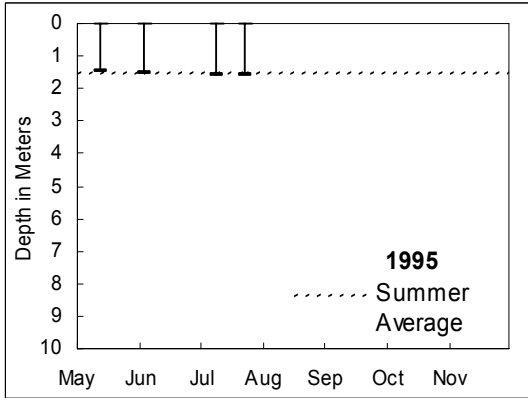
- Table includes summer (May-Oct) data only.
- Each box shows the range on top, followed by summer average in () and number of samples (*n*).
- Total phosphorus data are from samples taken at discrete depths only.

SUMMARY OF OTHER DATA

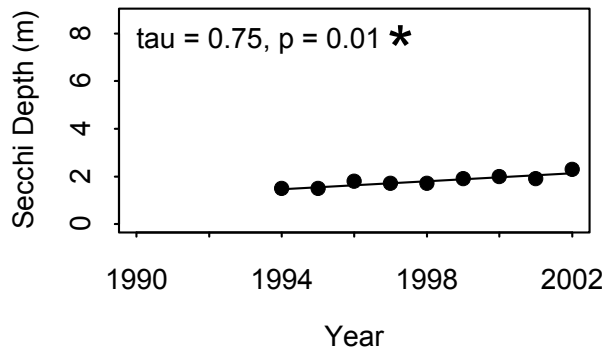
■ *pH*– from single observations in 1998 and 2000, pH averaged 6.7 near the surface and 6.2 near the bottom, which is within the normal range for Snohomish County lakes. Readings from 2001-2002 were similar.

■ *Conductivity*– 1998 and 2000 data averaged 86 μmhos in the epilimnion and 114 μmhos near the lake bottom, indicating relatively high levels of dissolved materials in the water compared to other Snohomish County lakes. Readings from 2001-2002 were similar.

WATER CLARITY

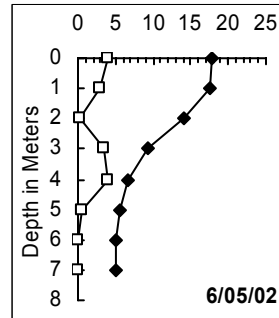
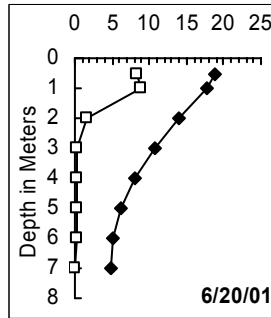
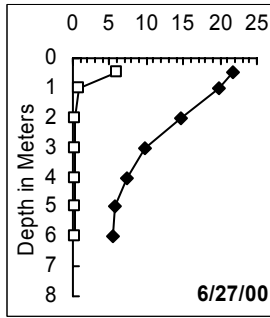
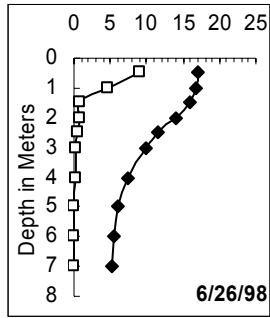


TREND ANALYSIS



* Statistically significant trend ($p \leq 0.10$)

DISSOLVED OXYGEN AND TEMPERATURE PROFILES (SELECTED YEARS)



—□— DO (mg/l) —◆— Temp (°C)

BASIC MONITORING DATA

1995									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
5/16/1995	1.6	15	17.5	7	100	none	breezy	lt brown	Moderate algae, aquatic plants. 30 ducks/geese.
6/6/1995	1.5	12.5	17	13	100	light		lt brown	Slight algae, moderate aquatic plants. A few ducks/geese.
7/11/1995	1.6	21	20.5	19	0	trace	light	lt brown	Moderate aquatic plants. 2 - 4 ducks/geese.
7/25/1995	1.6	22	22	25	10	none	light	lt brown	Slight algae, moderate aquatic plants. 2 nesting osprey, 1 eagle.

1996									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
6/4/1996	1.7	17	19.5	3	90	moderate	light	lt brown	Kayak Point golf course using holding pond with aerator on lake's west end. Slight algae, no scum, odor moderate plants. 10 ducks/geese.
6/21/1996	2.0	21.5	19	7	25	none	light		Slight algae, scum, plants. 10 ducks.
7/3/1996	1.6	17	19.5	11	100	light	breezy	lt brown	Slight algae, scum, plants, no odor. 10 ducks.
7/16/1996	1.7	19.5	22	14	25	none	breezy	lt brown	Aquatic plants prevalent along shore extending into lake along sunken logs, very thick plants on west half of lake (fully across). Lily pads, brown leaf pondweed and cattails.
7/30/1996	2.0	17.5	22.5	16.5	10	none	breezy	lt brown	No sign of beavers this year, however otters are definitely prominent.
9/25/1996	2.3	15.25	15	20.5	10	none	breezy	dk brown	

1997									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
5/15/1997	2.0	21	21.5	1	25	trace	light	lt brown	Moderate algae and algal scum, heavy aquatic plants, slight odor. 10 ducks, 6 geese
6/10/1997	1.7	20	19.5	1	10	none	light	grn brown	Slight algae, scum and musty odor, heavy plants. 2 ducks/geese. Osprey pair building nest atop tall snag.
7/1/1997	1.8	16.5	19	0.5	90	moderate	light	lt brown	Moderate algae, scum; heavy plants; slight odor. 4 ducks/geese.
7/31/1997	1.8	19	20	4	50	none	breezy	lt brown	Heavy algae, plants, moderate scum, odor. 6 ducks.
9/10/1997	1.7	22	19.5	14	90	none	breezy	lt brown	Heavy algae, plants, moderate musty odor. 10 ducks/geese. Surface appears oily, W half of lake, where most of the plants are located.

*Indicates data collected by Snohomish County staff.

1998									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
5/20/1998	2.0	17.5	17	-1	50	trace	breezy	lt brown	Lake level is above marker. No algae, scum, heavy aquatic plants. 10 ducks/geese. New home being built on north property. Osprey pair still nesting atop tall snag at east end of lake.
6/3/1998	1.7	20.5	19	0	10	none	breezy	lt brown	No odor; slight algae, scum; heavy plants. 10-15 Canada Geese visit daily.
*6/26/98	1.4				100	mod			No scum; heavy plants, algae (blue/green algae - probably microcystis, periphyton).
7/8/1998	1.3	21	21.5	2.5	0	none	breezy	lt brown	Heavy algae, scum & plants; volunteer included 1998 Great American Secchi Dip-in Report.
8/5/1998	2.1	22	22.5	9	10	none	calm	lt brown	Heavy algae, scum & plants; no odor; 8-10 ducks/geese.
8/19/1998	1.6	20.5	18.5	14	0	trace	calm	lt brown	Heavy algae, scum & plants; no odor; 10-12 ducks/geese.
9/14/1998	2.0	19	19.5	28	0	none	light	lt brown	Moderate algae; slight scum; heavy plants; no odor; 10-12 ducks/geese.

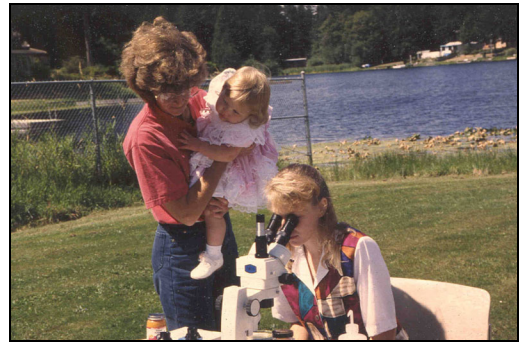
1999									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
5/25/1999	2.2	14	17.5	3	10	trace	strong	lt brown	
6/17/1999	2	18	20	3	90	trace	calm		
7/5/1999	2.1	22	19	-0.5	0	trace	breezy	lt brown	Lake level is the highest its been since we began monitoring in 1994.
8/1/1999	1.4	18.5	21	2	25	none	breezy	lt brown	
9/1/1999	2	16.5	17.5	7	0	moderate	breezy	lt brown	

2000									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
6/27/2000	2.2	26.5	21.9	8	0	none	light	med brown	Ph 7.6; high density of plants. 20 ducks, no algae or algae scum, and heavy aquatic plants.
*06/27/00	2.2	26.5	21.81		0	none	calm	medbrown	30 ducks, no algae or algae scum, and heavy aquatic plants.
7/15/2000	1.8	16	23	14	0	none	light	lt brown	13 ducks, no algae or algae scum, and heavy aquatic plants. A beaver.
8/9/2000	2	19	21.5	20	75	none	light	lt brown	13 ducks and heavy algae, algae scum, and aquatic plants.
9/12/2000	2.2	18	17	25	75	none	calm	lt brown	20 ducks and heavy algae, algae scum, and aquatic plants.

[Click here to view more recent data.](#)

HOW YOU CAN HELP LAKE ROWLAND

- Educate yourself about lake ecology and the lake's health.
- Use lawn and garden fertilizers sparingly; test your soil first; choose low or no phosphorus fertilizers.
- Retain or plant native vegetation adjacent to the water to protect the shoreline and filter pollution.
- Infiltrate or filter the runoff from rooftops, patios, and driveways rather than piping it to the lake.



- Cover or mulch bare soil areas.
- Use pesticides, herbicides, and household chemicals sparingly and never near the water.
- Maintain your septic system—have it inspected every two years and pumped when needed.
- Conserve water both inside and outside.
- Clean up pet wastes and keep livestock away from the lake shore.

- Learn to identify non-native invasive aquatic plants and animals; check your boat and trailer for invaders; never empty an aquarium into the lake.
- Do not feed geese or ducks.
- Join with neighbors or the local property owners' association to work together to protect the lake.



Contact Snohomish County Surface Water Management at 425-388-3464 for information about these topics or if you have questions about Lake Rowland.

(TTY users call 425-388-3700)

