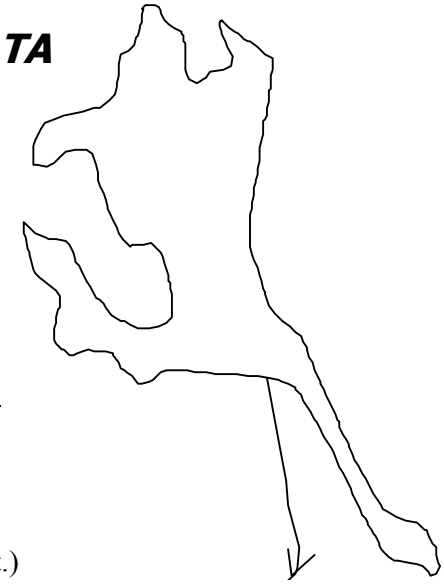
State of the Lakes Report
March 2003

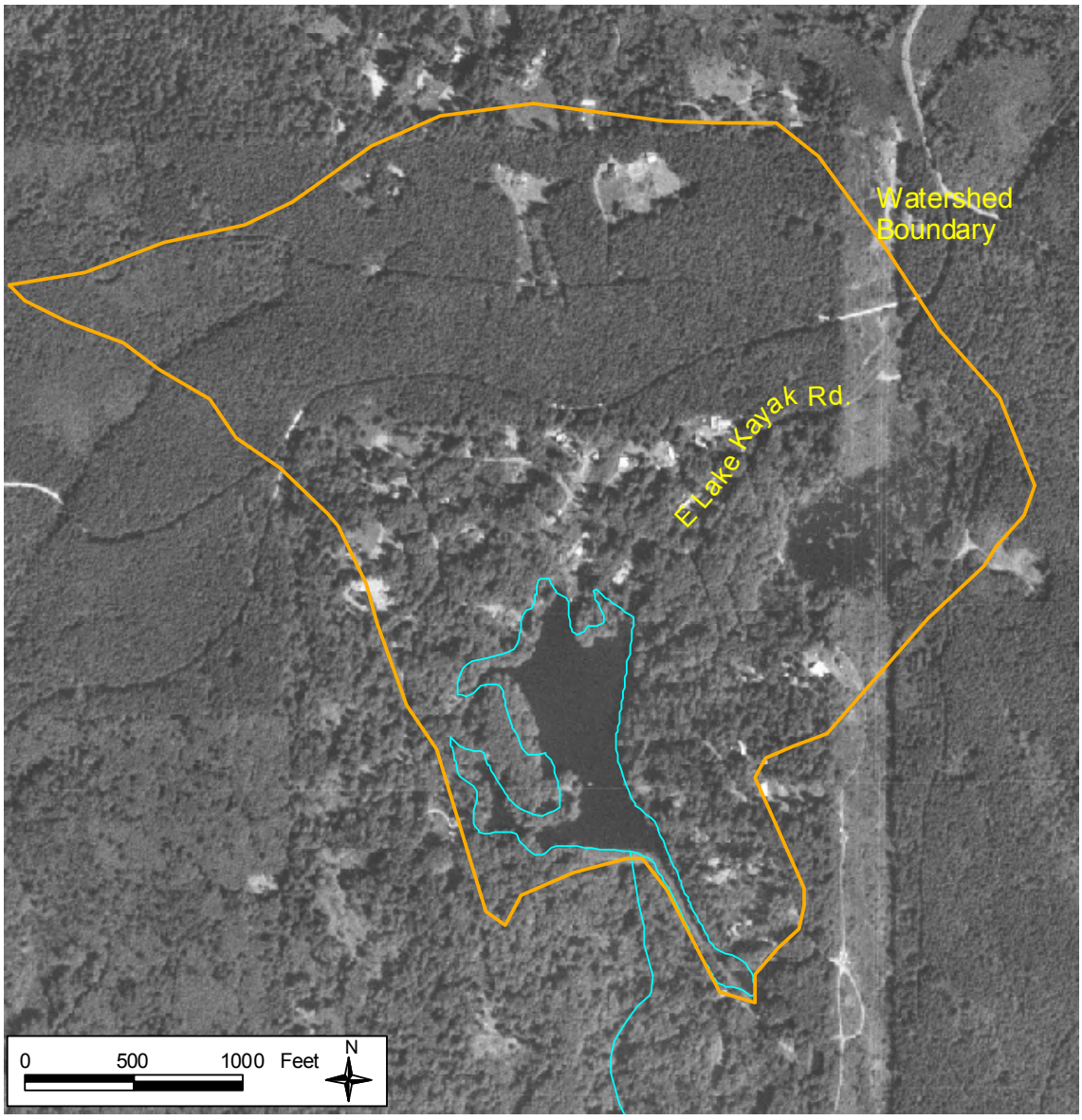
Snohomish County Public Works
Surface Water Management

LAKE AND WATERSHED DATA



Lake Area:	16 acres
Watershed Area:	222 acres
Watershed to Lake Area Ratio:	13.9
Maximum Depth:	>15 feet (4.5 meters)
Average Depth:	NA
Lake Volume:	NA
Length of Shore:	1.4 miles

	1974	Mid-90's
# of nearshore homes	0	11
# of homes/1000' of shoreline	0	1.5
% of homes with bulkhead or fill		18%
% of homes with some native vegetation near shore		55%
% of watershed developed (residential or commercial)	0%	10% (est.)



LAKE ASSESSMENT

DESCRIPTION

■ *Location/Access* – Lake Kayak is located in a rural area of the foothills approximately 5 miles southeast of the City of Monroe near the Snohomish-King county line. The lake is partially man-made—a dam maintains the water at its current level. There is no visible inflow to the lake. Lake Kayak drains south via Harts Swamp and Cherry Creek to the Snoqualmie River. The lake has no public access.

■ *Size/Shape* – The surface area of Lake Kayak covers 16 acres. No bathymetric maps of the lake are available, so actual lake depth and volume are unknown. However, monitors have determined that the lake is at least 4.5 meters deep.

■ *Watershed* – The Lake Kayak watershed, including the lake, covers 222 acres. The watershed is 13.9 times the size of the lake, which is near the median for Snohomish County lakes. The watershed is mostly forested. In 1974, there was virtually no development. By the mid-90's, residential development had increased slightly to about 10% of the watershed, still one of the least developed lake watersheds in the county.

■ *Shoreline* – The shoreline of Lake Kayak is 1.4 miles long and quite irregular because the dam has raised the lake level to match the natural contours. There were no houses around the shore in 1974. By the late-90s, there were 11 homes on the lake, but much of the shoreline remains undeveloped. Two of the lake shore homes have modified the shoreline with bulkheads or fill, while six homes have retained some native vegetation along the shore. A zone of vegetation helps to filter pollution before it reaches the lake.

LAKE CONDITIONS

■ *Water Clarity* – Water clarity in Lake Kayak was low to moderate from 1999 to 2002, with summer averages ranging from 1.8 to 2.9 meters. The average increased each year during this period. However, the length of the monitoring record is too short to determine if there is actually a significant trend toward improving water clarity.

■ *Color* – Dissolved organic (humic) material from nearby wetlands give the water a moderate degree of color. No measurements of color are available, but monitors usually describe the water as light brown or greenish brown.

■ *Nutrients* – Limited data suggest that total phosphorus concentrations are moderate to high compared to other county lakes. Samples in 1999, 2000, and 2002 ranged from 15 to 36 µg/l in the epilimnion, with an average of 17 µg/l during the summer of 2002. Hypolimnion total phosphorus values over this period ranged from 15 to 34 µg/l, with a 2002 average of 28 µg/l.

■ *Oxygen/Temperature* – Vertical profiles of dissolved oxygen and temperature measured once each in July 1999, July 2000, and July 2002 show that Lake Kayak is stratified between the warm upper waters and cool bottom waters. However, the lake has a fairly small hypolimnion because of the shallow depth. Dissolved oxygen was depleted below about 3 meters depth. This indicates the presence of decaying organic matter in the lake bottom.

■ *Algae* – No data are available on algae concentrations. However, observations by citizen volunteers and SWM staff from 1999-2002 indicate that algae are sometimes present at moderate to

heavy levels, but have not posed a severe problem in the lake.

■ *Aquatic Plants* – There have been no surveys of aquatic plants, although monitors have noted sparse plant growth throughout most of the lake. Aquatic plants are more dense along the shallow, narrow outlet arm of the lake. One species of native watermilfoil has been identified.

SUMMARY

■ *Trophic State* – Based on limited water quality data indicating low to moderate water clarity, moderate to high phosphorus concentrations, and high algal productivity, Lake Kayak may be classified as meso-eutrophic.

■ *Current Conditions/Trends* – Lake Kayak appears to be in satisfactory condition for a meso-eutrophic lake. In fact, water clarity may be increasing. However, there are not yet enough monitoring data to properly evaluate lake conditions or future risks. Typically, impounded lakes are at greater risk for declining water quality than natural lakes because they must reach a new ecological balance. Also, there is the potential for significant new development near the lake. For these reasons, Lake Kayak may be at risk for future declines in water quality.

■ *Future Concerns/Targets* – The main concern for Lake Kayak is the potential for impacts from future development around the lake shore and in the watershed. Maintaining current water clarity and nutrient levels is the target for the lake until a better understanding of baseline conditions can be reached.

■ *Recommendations* – New development near the lake should take precautions to control runoff and nutrient pollution. Additional monitoring, with focus on water clarity, nutrients, and algae, is needed to better characterize Lake Kayak. A bathymetric map and an aquatic plant survey should also be completed to establish baseline conditions.

CITIZEN VOLUNTEERS

Thanks to Pat and Bill Waldrop and Terrie Foote for volunteer monitoring of Lake Kayak.

DATA SUMMARY TABLE

Source	Date	Secchi Depth (meters)	Total Phosphorus (*u*g/l)		Color (Pt-Co scale)	Chlorophyll *a* (*u*g/l)
			Surface	Bottom	Epilimnion	Epilimnion
SWM Staff or Volunteer	Summer **1999**	1.2 - 2.3 (1.8) *n = 6*	21	24	-	-
SWM Staff or Volunteer	Summer **2000**	1.2 - 3.0 (2.2) *n = 8*	36	34	-	-
SWM Staff or Volunteer	Summer **2001**	2.1 - 3.5 (2.8) *n = 7*	-	-	-	-
SWM Staff or Volunteer	Summer **2002**	2.1 - 4.2 (2.9) *n = 10*	15 -20 (17) *n = 4*	15 - 34 (28) *n = 4*	-	-

NOTES

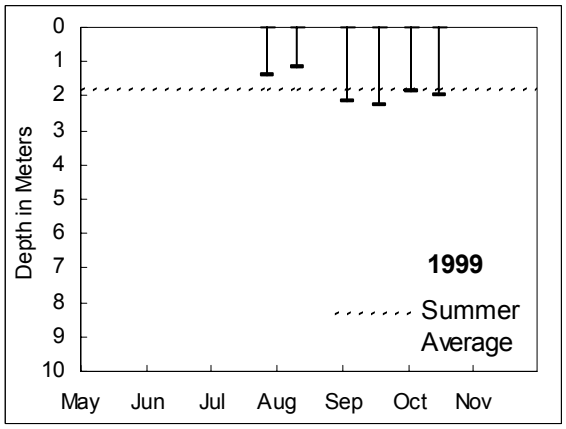
- Table includes summer (May-Oct) data only.
- Each box shows the range on top, followed by summer average in ( ) and number of samples (n).
- Total phosphorus data are from samples taken at discrete depths only.

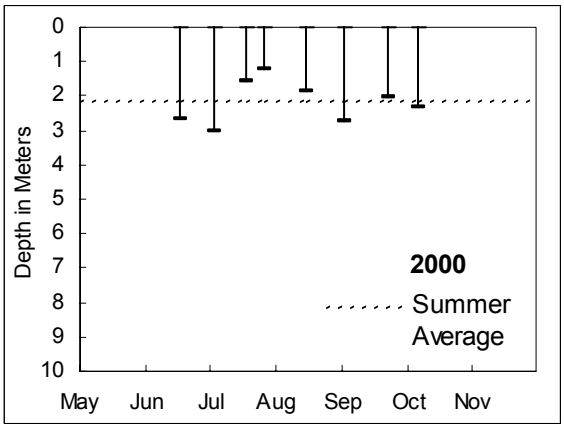
SUMMARY OF OTHER DATA

■ *pH* – from single observations in 1999 and 2000, pH averaged 7.1 near the surface and 6.5 near the bottom, which is within the normal range for Snohomish County lakes. Readings from 2002 were similar.

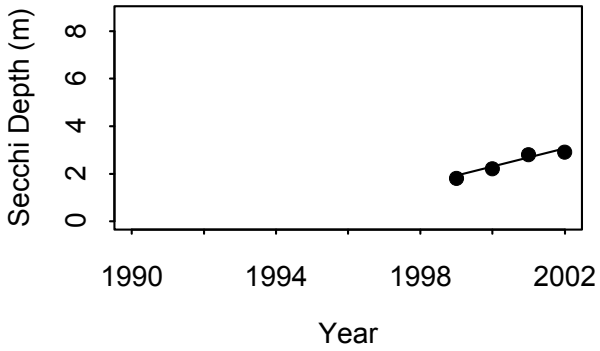
■ *Conductivity* – 1999 and 2000 data averaged 56 µmhos in the epilimnion and 106 µmhos near the lake bottom, indicating moderate levels of dissolved materials in the water compared to other Snohomish County lakes. Readings from 2002 were similar.

WATER CLARITY

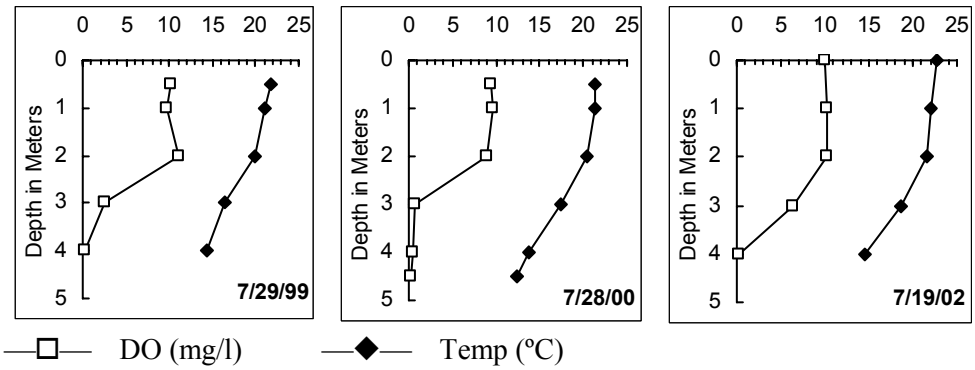




TREND ANALYSIS



DISSOLVED OXYGEN AND TEMPERATURE PROFILES (SELECTED YEARS)



BASIC MONITORING DATA

1999									
DATE	**Secchi Depth (meters)**	**Air Temp (C)**	**Water Temp (C)**	**Lake Level (in)**	**Clouds (%)**	**Rain**	**Wind**	**Color**	**COMMENT**
*7/29/99	1.5		21.74		25	none	light	yellowgrn	Took sample of milfoil, sent to DOE for ID - might be native.
8/12/99	1.2	18	20	8.75	100	trace	light	grnbrown	
9/4/99	2.2	19	18	12	100	none	calm	lt brown	
9/19/99	2.3	27	18	13.5	0	none	light	grnbrown	Several ducks during the week.
10/3/99	1.9	18	16	14	0	none	calm	lt brown	
10/16/99	2	17	13	12	10	light	light	grnbrown	Busy beaver in lake. Leech on marker point in lake.

2000									
DATE	**Secchi Depth (meters)**	**Air Temp (C)**	**Water Temp (C)**	**Lake Level (in)**	**Clouds (%)**	**Rain**	**Wind**	**Color**	**COMMENT**
6/20/00	2.7	22	18	7.5	10	trace	breezy	lt brown	10 ducks, slight algae and aquatic plants, and no algae scum.
7/5/00	3	23	21	7.5	50	trace	breezy	lt brown	10 ducks, slight algae and aquatic plants, and no algae scum.
7/20/00	1.6	23	21	11	50	light	breezy	lt brown	Blue-green algae growth. 7 ducks, slight algae and aquatic plants, and no algae scum.
*07/28/00	1.2	20	21.41		100	trace	calm	lt brown	Large clumps of algae. 1 duck, heavy algae, no algae scum, and slight aquatic plants.
8/17/00	1.9	25	22	16	0	none	calm	lt green	5 ducks, moderate algae, no algae scum, and slight aquatic plants.
9/3/00	2.8	23	18	17	50	trace	light	lt green	3 ducks, slight algae and aquatic plants, and no algae scum.
9/23/00	2.1	23	17	16	0	trace	light	lt brown	5 ducks, slight algae and aquatic plants, and no algae scum.
10/7/00	2.4	23	14	13	0	none	light		Algae around edge of lake. 2 ducks, slight algae and algae scum, and no aquatic plants.
10/21/00	2.8	15	12	8	10	heavy	calm	lt brown	Sm green algae particles around decaying leaves. 6 ducks, slight algae and aquatic plants, and no algae scum.

*Indicates data collected by Snohomish County staff.

Click here to view more recent data.

HOW YOU CAN HELP LAKE KAYAK

- 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 Kayak.

(TTY users call 425-388-3700)

Snohomish County
Public Works
Surface Water Management

Working together for people, streams & fish.