

Lake Wagner

Lake Wagner appears to be in healthy condition, with moderate water clarity, low levels of algae, low to moderate phosphorus concentrations, and dense aquatic plants. Maintaining the health of the lake depends on controlling nutrient runoff from development around the lake and the watershed.

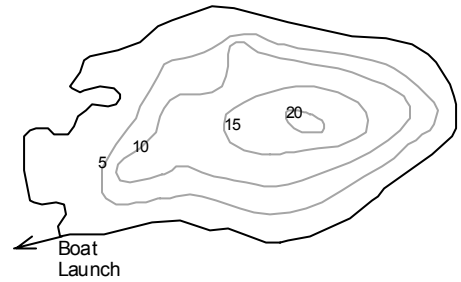


State of the Lakes Report
March 2003

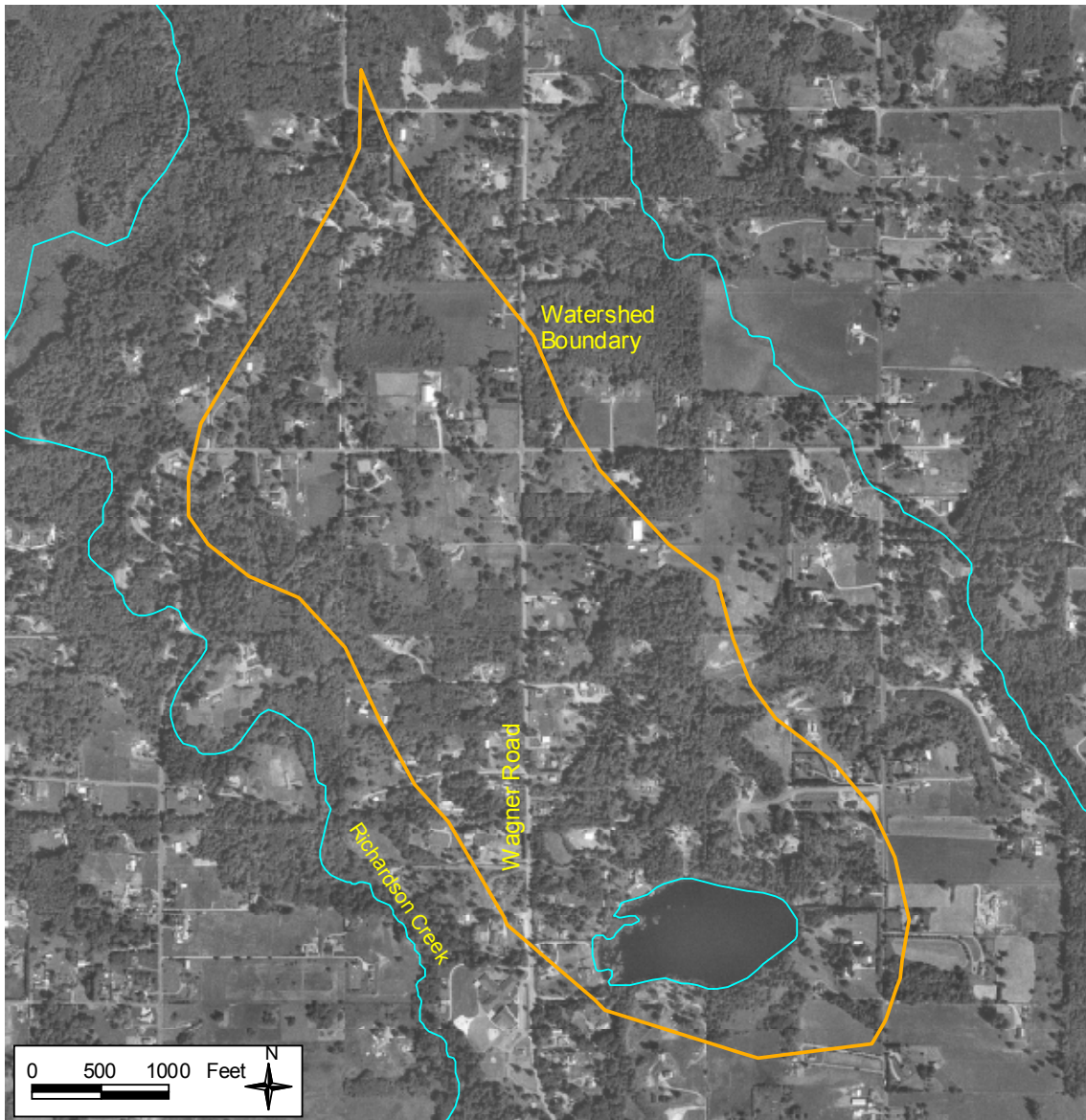
Snohomish County Public Works
Surface Water Management

LAKE AND WATERSHED DATA

Lake Area: 19 acres
 Watershed Area: 369 acres
 Watershed to Lake Area Ratio: 19.4
 Maximum Depth: 22 feet (6.7 meters)
 Average Depth: 13 feet (4.0 meters)
 Lake Volume: 250 acre-feet
 Length of Shore: 0.7 miles



	<u>1974</u>	<u>Mid-90's</u>
# of nearshore homes	2	11
# of homes/1000' of shoreline	0.5	2.8
% of homes with bulkhead or fill		9%
% of homes with some native vegetation near shore		54%
% of watershed developed (residential or commercial)	5%	30% (est.)



LAKE ASSESSMENT

DESCRIPTION

■ **Location/Access**– Lake Wagner is located three miles northeast of the City of Monroe. There are no visible streams feeding the lake. The lake outlet is piped westward toward Richardson Creek, which empties into Woods Creek and eventually reaches the Skykomish River. There is a public boat launch located at the southwest corner of the lake. Gas-powered boats are not permitted.

■ **Size/Shape**– The lake is 19 acres in size and relatively shallow, with a maximum depth of 6.7 meters and an average depth of 4.0 meters. The lake volume contains 283 acre-feet of water.

■ **Watershed**– The Lake Wagner watershed, including the lake, covers 369 acres. The watershed is 19.4 times the size of the lake, which is a larger ratio than for most Snohomish County lakes. A large watershed means that the lake has more potential for pollution impacts from the surrounding lands than a lake with a small watershed. In 1973, there were a number of small agricultural operations in the watershed, but only 5% of the area was developed in residential uses. Through the 1980s and 1990s, residential development increased to about 30% and agriculture declined.

■ **Shoreline**– The shoreline of Lake Wagner is 0.7 miles in length and only sparsely developed. There is still evidence of past lumber mill activity, including pilings from an old railway line and large logs in the lake. Along the shoreline, there were 2 homes in 1973 and 11 by the mid-90s. About 54% of the homes have retained some native vegetation by the shore, while only 9% of the homes have added bulkheads or fill. A zone of native vegetation is important for filtering pollution.

LAKE CONDITIONS

■ **Water Clarity**– Summer water clarity in Lake Wagner is moderate, with a long-term average between 1993 and 2002 of 3.9 meters. Summer averages have also been somewhat variable, with averages as high as 4.4 meters in 1999 and as low as 2.9 meters in 2001. In general, Lake Wagner



has clear water for a shallow lake. This may be because the abundant aquatic plants stabilize the bottom sediments and utilize nutrients that would otherwise be used for algal growth.

■ **Color**– The lake water is lightly colored by algae and dissolved organic (humic) materials from wetlands. The color is usually described as light yellow-brown or greenish-brown.

■ **Nutrients**– Summer average total phosphorus concentrations in the epilimnion are moderately low, ranging from 9 to 13 $\mu\text{g/l}$ from 1996 to 2002, except for 2001 when the average was 21 $\mu\text{g/l}$. A 1981 sample showed low concentrations. Total phosphorus averages in the hypolimnion have been higher and more variable. Hypolimnion averages in 1981 and 1996 were 10 and 16 $\mu\text{g/l}$, respectively. However, hypolimnion averages in 1999 and 2001 were 90 and 74 $\mu\text{g/l}$. Elevated phosphorus concentrations in the hypolimnion suggest that phosphorus is being released from the bottom sediments during times of oxygen depletion. Nitrogen levels measured in 1981 indicate that nitrogen was moderately abundant and that phosphorus availability was probably limiting algal growth.

■ **Alkalinity** – Data from 1994 and 1995 indicate that Lake Wagner has a low buffering capacity and may be sensitive to nutrient pollution.

■ **Oxygen/Temperature**– Vertical profiles of dissolved oxygen and temperature for the summers of 1995 through 2002 show that the lake stratifies

into warm, oxygenated upper waters and cool, oxygen-depleted bottom waters. However, because the lake is shallow, the hypolimnion is quite small. Generally, decaying organic matter in the lake bottom depletes the dissolved oxygen only in the layer of water below 4 or 5 meters depth. Some of the measurements show spikes in dissolved oxygen at 3 or 4 meters depth, suggesting vigorous algal growth at this level.

- ***Algae*** – Chlorophyll *a* data from three samples in the summers of 1994 and 1995 showed values of 2.6 to 3.2 µg/l. Four samples in summer 2002 averaged 2.0 µg/l. A single sample in 1981 was 6.6 µg/l. These data suggest low to moderate production of algae in the lake. Analysis of three algae samples in 1994 and 1995 revealed low biovolumes, with a mixed algal community dominated at times by greens, gold-browns, or cryptomonads. Lake monitors have observed blue-green algal blooms on occasion in the lake.

- ***Aquatic Plants*** – Because of the shallow water and moderate water clarity, aquatic plant growth in the lake is dense. The plant community is also fairly diverse, dominated by yellow water-lily, elodea, thin-leaf pondweed, and muskgrass near the shore, and by coontail and brittlewort in slightly deeper water. The presence of abundant aquatic plants helps stabilize the bottom sediments and may be a factor in limiting algae and maintaining clear water.

SUMMARY

- ***Trophic State*** – Based on moderate water clarity, low to moderate phosphorus concentrations, low levels of algae, occasional blue-green algal blooms, and dense aquatic plants, Lake Wagner may be classified as mesotrophic.

- ***Current Conditions/Trends*** – Lake Wagner appears to be in healthy condition for a mesotrophic lake. Monitoring data do not show any significant trends in water clarity or phosphorus concentrations. However, the low clarity and high phosphorus concentrations in 2001 may indicate the potential for future problems.

- ***Future Concerns/Targets*** – The primary concern for Lake Wagner is to be able to maintain

good water quality in the face of the potential for widespread growth in the watershed and around the lake shore. The past episodes of increased phosphorus and occasional blue-green algal blooms also raise concerns. Maintaining current water clarity and phosphorus levels is the target for the lake.

- ***Recommendations*** – The lake should be monitored carefully to identify any changes in water clarity, nutrient levels, or algal growth. All new development around the lake shore and in the watershed should take precautions to control runoff and reduce nutrient pollution. No large scale removal of aquatic plants should be undertaken.

CITIZEN VOLUNTEERS

Thanks to Jim Jaskowiak and Peter Mellinger for volunteer monitoring of Lake Wagner.

DATA SUMMARY TABLE

Source	Date	Secchi Depth (meters)	Total Phosphorus (ug/l)		Color (Pt-Co scale)	Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion	Epilimnion
Sumioka and Dion, 1985	7/7/81	3.0	10	<10	-	6.6
Volunteer	Summer 1993	2.7 - 3.9 (3.2) n = 8	-	-	-	-
SWM Staff or Volunteer	Summer 1994	2.9 - 4.9 (3.8) n = 7	-	-	15 - 30 (23) n = 2	2.6 - 2.9 (2.8) n = 2
SWM Staff or Volunteer	Summer 1995	3.3 - 4.7 (3.9) n = 4	-	-	23	3.2
SWM Staff	Summer 1996	3.2 - 5.0 (4.1) n = 2	3 - 15 (9) n = 2	8 - 12 (10) n = 2	-	-
SWM Staff	Summer 1997	3.7 - 4.7 (4.2) n = 2	7 - 11 (9) n = 2	20 - 22 (21) n = 2	-	-
SWM Staff or Volunteer	Summer 1998	4.0 - 5.0 (4.3) n = 8	6 - 13 (9) n = 4	14 - 65 (38) n = 4	-	-
SWM Staff or Volunteer	Summer 1999	4.0 - 4.9 (4.4) n = 8	8 - 10 (9) n = 4	63 - 145 (90) n = 4	-	-
SWM Staff	Summer 2000	3.9 - 4.2 (4.1) n = 4	5 - 16 (12) n = 4	6 - 22 (16) n = 4	-	-
SWM Staff	Summer 2001	1.8 - 3.4 (2.9) n = 4	11 - 42 (21) n = 4	51 - 127 (74) n = 4	-	-
SWM Staff	Summer 2002	3.4 - 4.6 (4.0) n = 4	7 - 18 (13) n = 4	35 - 62 (45) n = 4	-	1.6 - 2.7 (2.0) 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

■ **Total Nitrogen** – single samples in 1981 showed 0.64 mg/l in the upper waters and 0.88 mg/l near the lake bottom; these data suggest that nitrogen was abundant and not limiting algal growth at that time.

■ **Alkalinity** – limited data from 1994 and 1995 ranged from 21 – 25 mg/l CaCO₃, which suggests that Wagner has a low buffering capacity and may be sensitive to nutrient pollution.

■ **pH** – readings from 1994 through 2000 averaged 7.0 near the surface and 6.4 near the bottom, which is near neutral and typical of Snohomish County lakes. Readings from 2001-2002 were similar.

■ **Conductivity** – 1994-2000 data averaged 51 µmhos near the surface and 98 µmhos near the lake bottom, indicating moderate levels of dissolved materials in the water. Readings from 2001-2002 were similar.

■ **Iron** – limited 1994-95 data showed high levels in the epilimnion (avg. 155 µg/l) and slightly higher levels in the hypolimnion (avg. 330 µg/l), which indicates some release of iron and phosphorus from the bottom sediments under low oxygen conditions.

■ **Algae** – the following table shows the total biovolume and percent biovolume of the main types of algae from three samples collected in 1994-95. The data show that the total algal volumes were low and that greens, gold-browns,

and cryptomonads were each most prevalent at times. Cell counts of the same samples revealed a similar pattern of abundance.

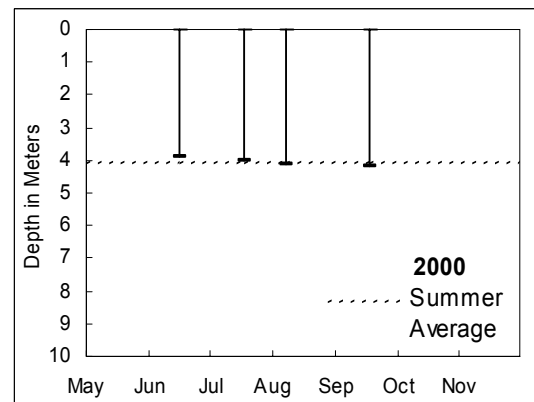
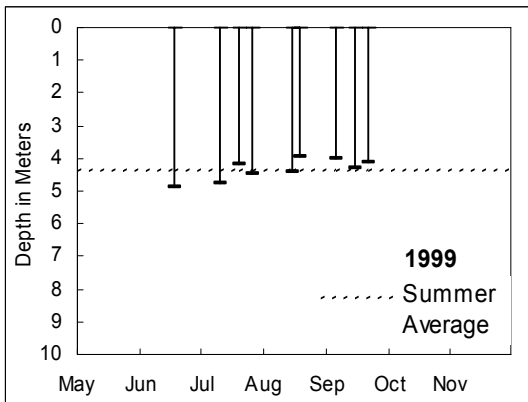
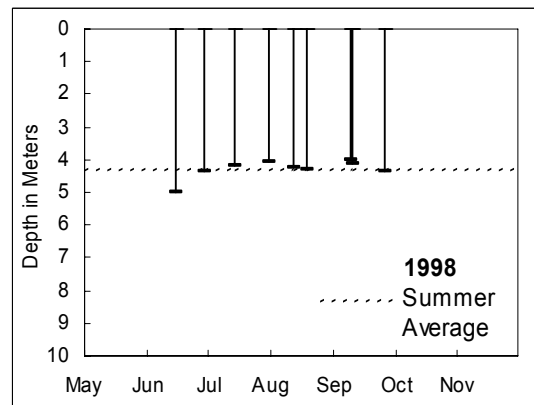
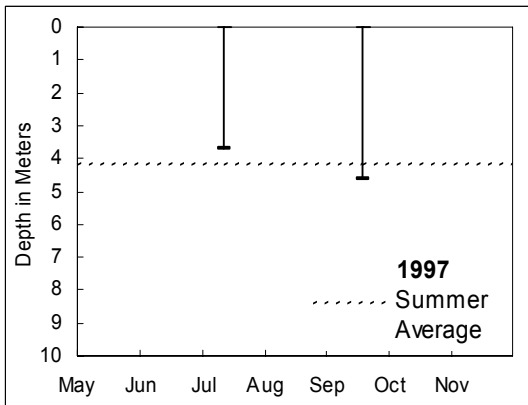
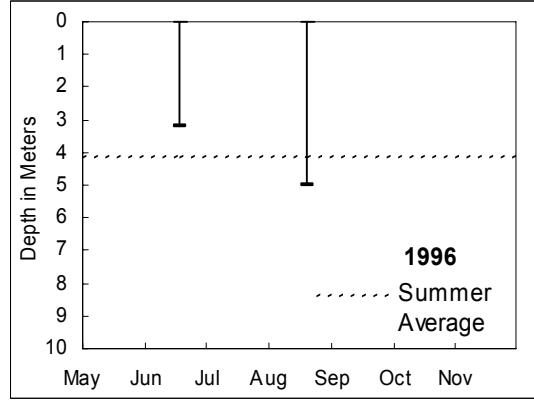
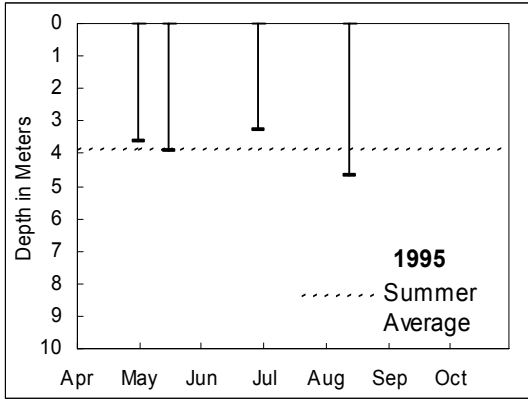
ALGAE TYPES	7/15/94	9/12/94	8/14/95
Cyanophyta (Blue-greens)	4%	12%	4%
Chlorophyta (Greens)	46%	3%	8%
Chrysophyta (Golden/diatoms)	34%	63%	38%
Cryptophyta (Cryptomonads)	16%	16%	47%
Euglenophyta (Euglenoids)	1%	6%	2%
Pyrrhophyta (Dinoflagellates)	0%	0%	0%
TOTAL BIOVOLUME (mm ³ /l)	0.43	0.375	0.329

■ **Fish** – according to the Washington State Department of Fish and Wildlife (WDFW), fish species found in Lake Wagner include rainbow trout and largemouth bass. WDFW usually stocks the lake each year with rainbow trout.

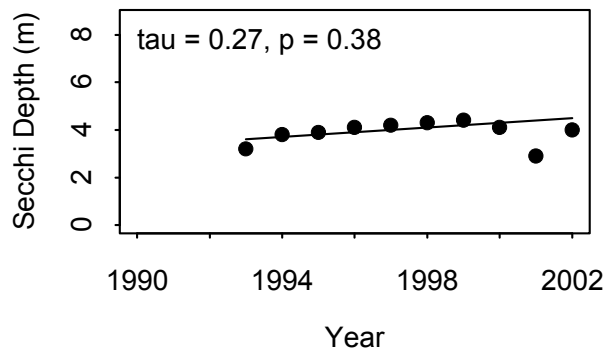
DATA SOURCES

In addition to data from Snohomish County SWM staff and citizen volunteers, data for Lake Wagner are also available from: Sumioka and Dion, 1985. Please refer to the full list of references in the County-Wide Summary.

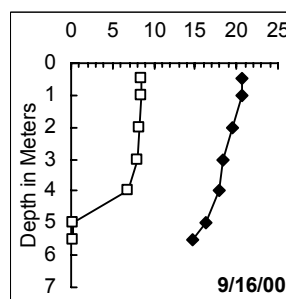
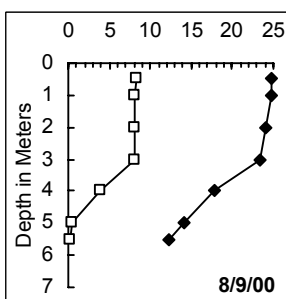
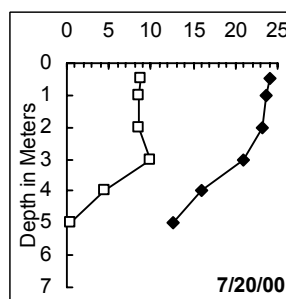
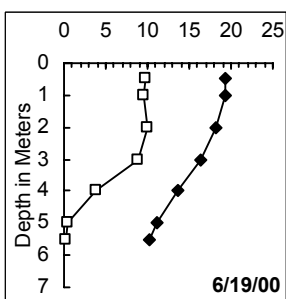
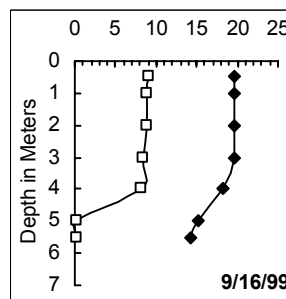
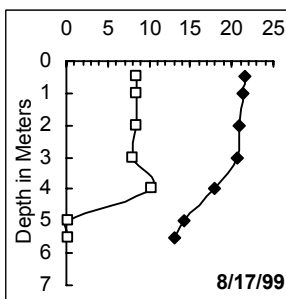
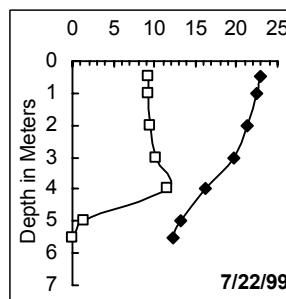
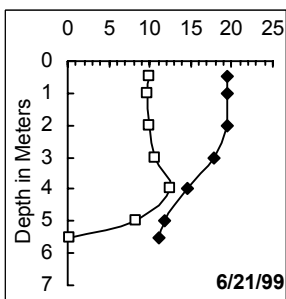
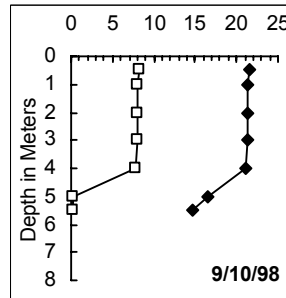
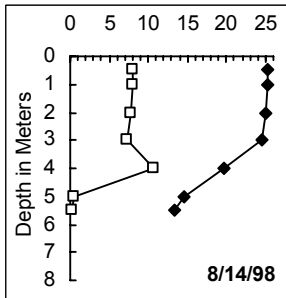
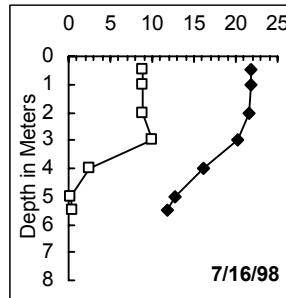
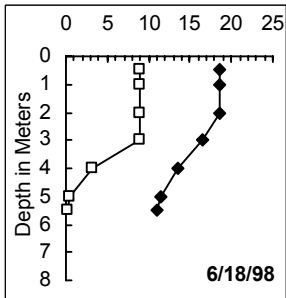
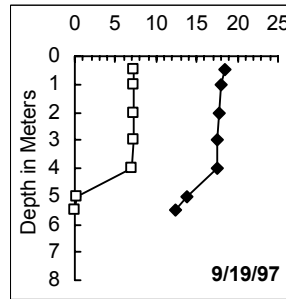
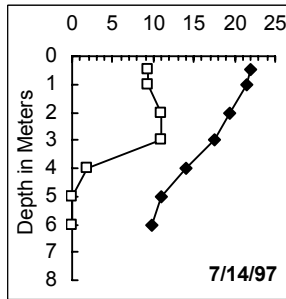
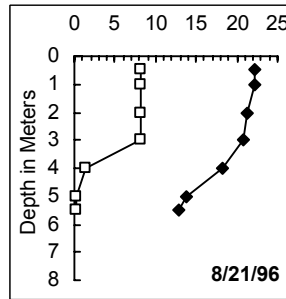
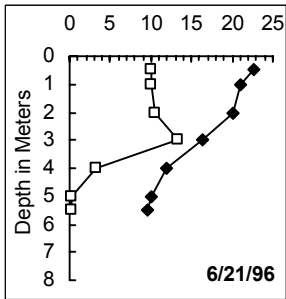
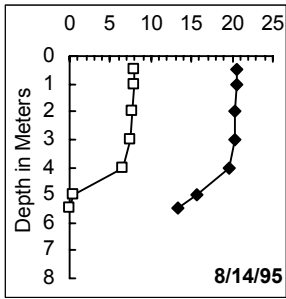
WATER CLARITY



TREND ANALYSIS



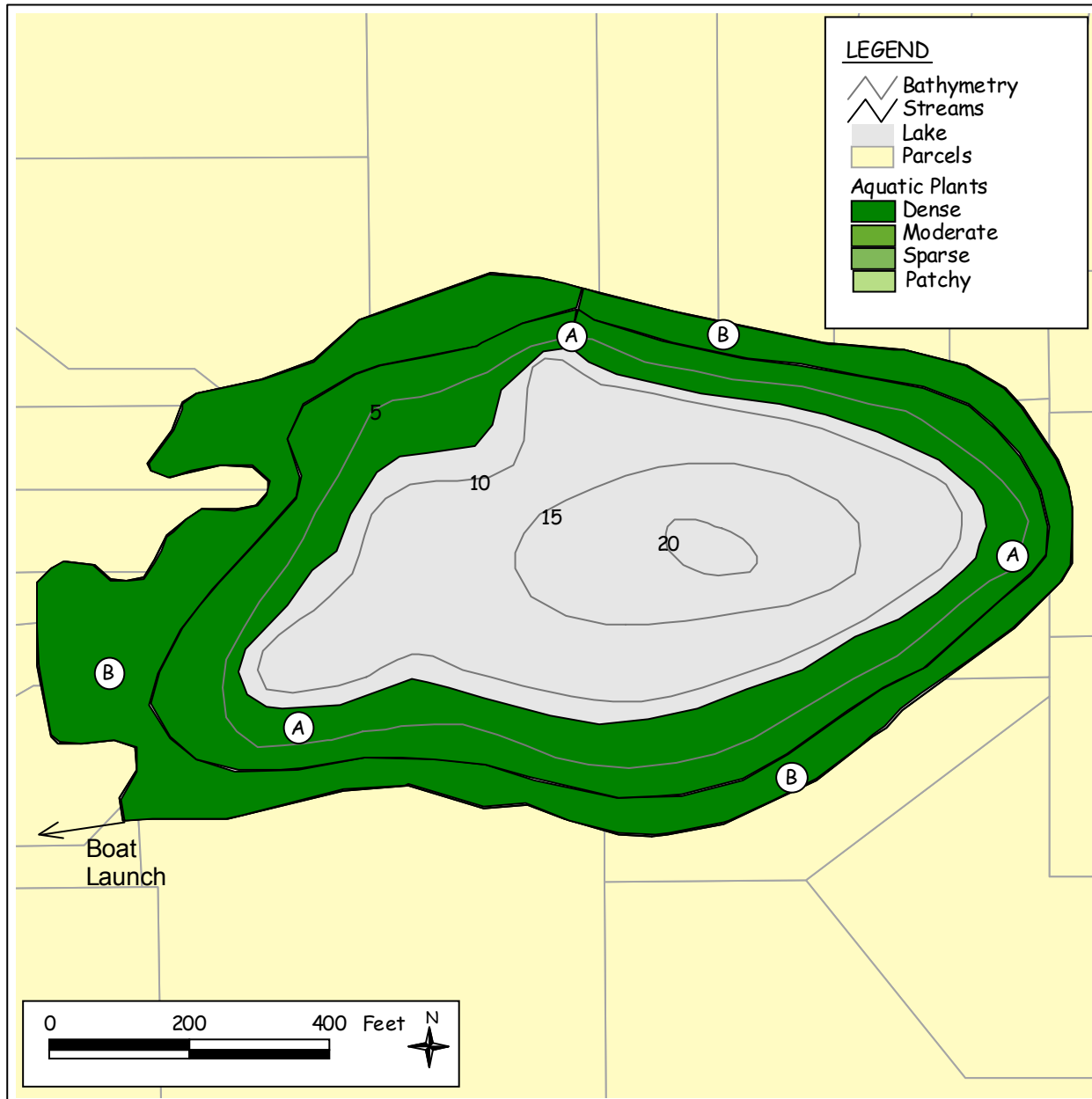
DISSOLVED OXYGEN AND TEMPERATURE PROFILES (SELECTED YEARS)



DO (mg/l)

 Temp (°C)

AQUATIC PLANTS



Area	Density	Dominant Plants	Other Plants
A	Dense	<i>Ceratophyllum demersum</i> (Coontail) <i>Nitella sp.</i> (Brittlewort)	<i>Elodea canadensis</i> (Common elodea) <i>Chara sp.</i> (Stonewort, Muskgrass)
B	Dense	<i>Nuphar polysepalum</i> (Yellow water-lily) <i>Potamogeton sp.</i> (Thin-leaf pondweed) <i>Chara sp.</i> (Stonewort, Muskgrass) <i>Elodea canadensis</i> (Common elodea)	<i>Potamogeton praelongus</i> (White-stalked pondweed) <i>Ceratophyllum demersum</i> (Coontail) <i>Utricularia vulgaris</i> (Common bladderwort) <i>Ludwigia palustris</i> (False loosestrife) <i>Sagittaria latifolia</i> (Broad-leaf arrowhead)

BASIC MONITORING DATA

1995									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
5/4/1995	4.1	14	15	11.3	10	heavy	breezy	ltgreen	Slight aquatic plants. 1 goose, 4 ducks. Dead fish by boat launch. New cabin built by lake.
5/19/1995	4.6	16	17	12.3	0	light	light	ltgreen	Slight algae, algae scum, aquatic plants. 2 ducks with 6 ducklings.
7/1/1995	3.5	17	15	16	10	none	light	ltgreen	Slight aquatic plants.
*08/14/95	4.7				100	light	calm	grnbrown	More algae at depth. Lots of trash near boat launch.

1996									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*06/21/96	3.2				10	none	calm	greenish	Nuphar dominant; few other plants.
*08/21/96	5.0				50	trace	breezy	lt brn	Algae - planktonic large cells, filamentous on bottom. Some medium-size bryozoans.

1997									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*07/14/97	3.8				50	none	light	lt brown	Zooplankton abundant at 3 meters. Saw 100+/- catfish(?) about 0.75" to 1.5" long, near boat launch. Lots of nuphar, elodea, pondweed and some ludwigia.
*09/19/97	4.7				0	mod	calm	grnbrown	

1998									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*6/18/98	5.0				100	mod	calm	lt brown	10 ducks/geese; no scum; slight plants; moderate algae.
7/2/1998	4.4	24	21		90	none	light	grnbrown	Slight algae and plants; no scum or odor; 16 ducks/geese; Lily pads on west side of lake.
*7/16/98	4.3				0	lt-mod.	calm	yellowbrwn	9 geese; no scum, odor; moderate plants (elodea, coontail, cattail, water lily), algae (periphyton, blue-greens). Garbage @ boat launch.

*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
8/2/1998	4.1	20.5	23		25	light	calm	lt brown	No to very slight algae; no scum or odor; slight plants; 3 ducks; garbage by launch ramp area; picked up garbage.
*8/14/98	4.3				0	none	light	yellowgrn	1 duck (evidence of more); no scum, odor; slight algae; moderate plants. Very small hypolimnion. 1 turtle.
8/20/1998	4.3	23	21		10	none	light	grnbrown	No algae, scum or odor; slight plants; 3 ducks.
*9/10/98	4.0				0	none	light	yellowgrn	2 coots; no scum; slight algae (a few large clumps of algae -- maybe spirogyra, spirulina), odor (bottom sample); moderate plants (mostly pondweed (thin) with some elodea).
9/11/1998	4.2	25.5	20.5	24	0	none	calm	lt brown	No algae, scum or odor; slight plants; no ducks/geese; fine particulates in water.
9/27/1998	4.4	22	18		0	light	light	lt brown	No algae, scum, or odor. 55 geese. Lake level is down almost a foot from early summer.

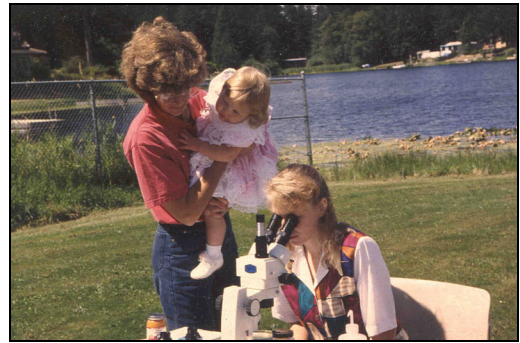
1999									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*6/21/99	4.9	16	19.4		100	light	calm	medgreen	
7/13/1999	4.8	24.5	22		0	none	light	grnbrown	
*7/22/99	4.2	24	22.8		0	light	calm	yellowbrn	Large clumps of algae in water column.
7/28/1999	4.5	24.5	22		0	none	calm	lt brown	
*8/17/99	4.4	18.3	21.6		0	moderate	light	yellowbrn	Slight musty odor from bottom sample.
8/20/1999	4	23.5	24		10	none	calm	grnbrown	
9/7/1999	4	20	18		0	moderate	calm	lt brown	New dock N side of lake.
*9/16/99	4.3	13	19.7		100	none	calm	medbrown	Lots of zooplankton. Slight musty odor from bottom sample.
9/22/1999	4.2	27	20		0	none	calm	lt brown	

2000									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*06/19/00	3.9	13	19.31		100	light	calm	medyelgrn	11 ducks, moderate algae and aquatic plants, and no algae scum.
*07/20/00	4	24	24.06		0	none	light	medgreen	2 ducks, moderate algae and algae scum, and no aquatic plants.
*08/09/00	4.1	23	24.78		0	none	light	medgrnbrn	3 ducks, moderate algae and algae scum, and no aquatic plants.
*09/19/00	4.2	22	20.74		100	none	light	medyelbrn	Moderately thick algae scum near shore, yellow-green in color, probably a blue-green. Lots of zooplankton. 4 ducks and moderate algae, algae scum, and aquatic plants.

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

HOW YOU CAN HELP LAKE WAGNER

- 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 Wagner.

(TTY users call 425-388-3700)

