

Lake Bryant

Lake Bryant appears to be in healthy condition for a eutrophic lake. The lake has low water clarity (partly due to dark water color), high nutrient concentrations, and depleted oxygen levels. Shoreline development is unlikely because of peat bog soils, but future development in the watershed and potential leaching from a nearby closed landfill are concerns.

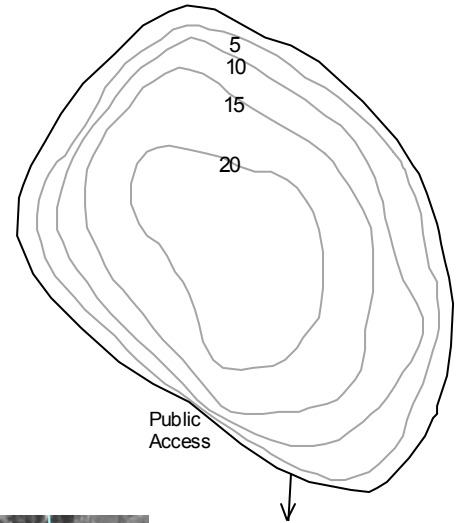


State of the Lakes Report
March 2003

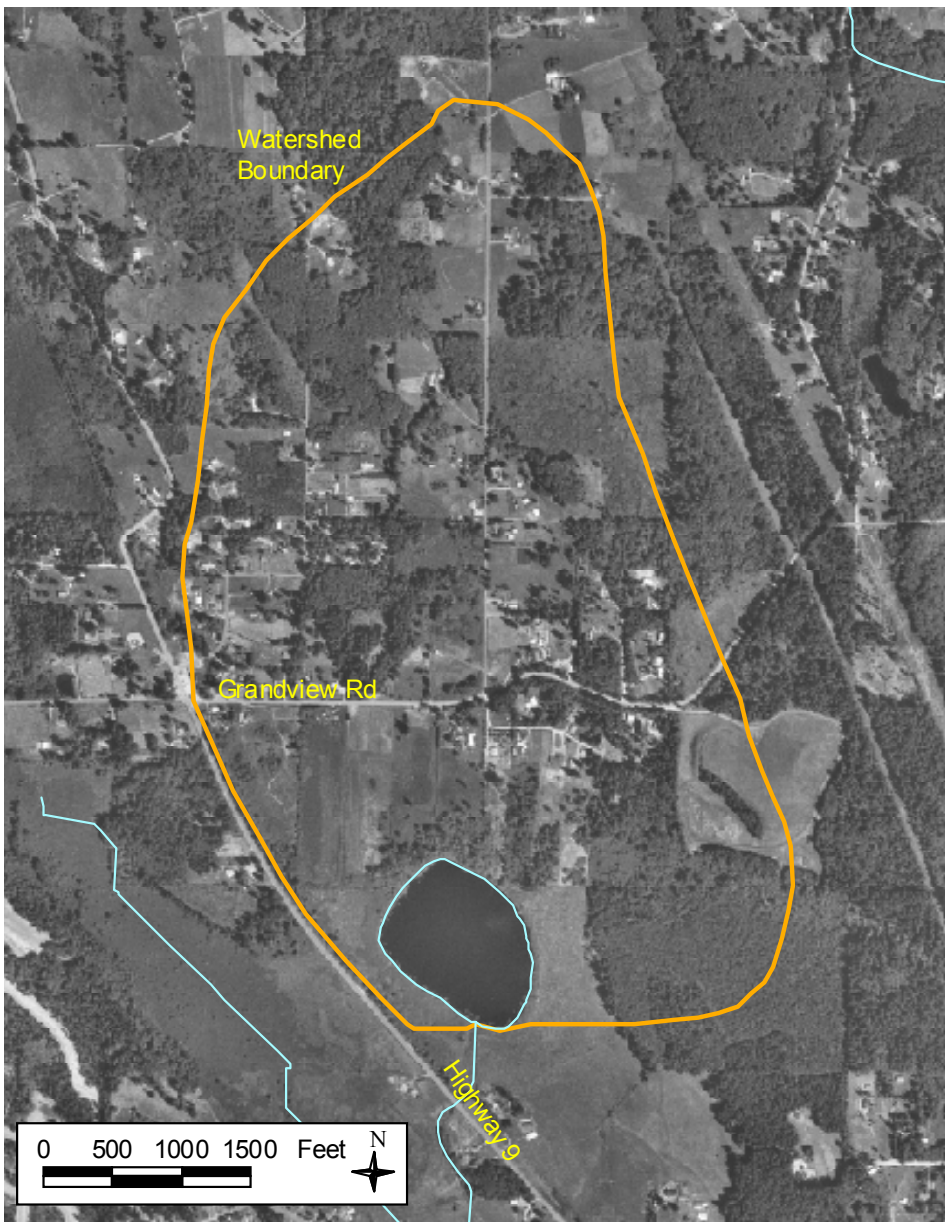
Snohomish County Public Works
Surface Water Management

LAKE AND WATERSHED DATA

Lake Area: 21 acres
 Watershed Area: 468 acres
 Watershed to Lake Area Ratio: 22.3
 Maximum Depth: 23 feet (7.0 meters)
 Average Depth: 14 feet (4.3 meters)
 Lake Volume: 295 acre-feet
 Length of Shore: 0.9 miles



	<u>1974</u>	<u>Mid-90's</u>
# of nearshore homes	0	0
# of homes/1000' of shoreline	0.0	0.0
% of homes with bulkhead or fill		NA
% of homes with some native vegetation near shore		NA
% of watershed developed (residential or commercial)	4%	20% (est.)



LAKE ASSESSMENT

DESCRIPTION

■ ***Location/Access***— Lake Bryant is located just east of Highway 9 about three miles northwest of Arlington. There is no visible inflow to the lake. An overgrown outlet channel—formerly maintained as an agricultural ditch—drains across Highway 9 and eventually south to the Stillaguamish River. A walk-in public access point from Highway 9 is located on the west shore.

■ ***Size/Shape***— Lake Bryant is roughly circular, suggesting that it is a kettle lake formed by a melting ice block, rather than by moving glaciers. The lake is 21 acres in size with a maximum depth of 7 meters and an average depth of 4.3 meters. The lake volume contains 520 acre-feet of water. Anecdotal evidence indicates that the lake was mostly drained in the first half of the 20th century to expand the surrounding agricultural lands. Water has returned to historic levels in recent decades.

■ ***Watershed***— The Lake Bryant watershed, including the lake, covers 468 acres. The watershed is large, about 22 times the size of the lake. This means that there is a greater potential for impacts from the watershed than at a lake with a small watershed. In 1973, only 4% of the watershed was residential and 40% was agricultural. By the mid-1990s, active agriculture had significantly diminished, and residential uses covered about 20% of the watershed. During the 1970s and 1980s, Snohomish County operated a sanitary landfill about 2000 feet east of the lake. The landfill is now closed.

■ ***Shoreline***— The shoreline of Lake Bryant is 0.9 miles in length. The lake sits in a bog, with wetlands encircling it. Therefore, there are no nearshore homes, and the entire shoreline is vegetated. However, many of the larger trees immediately surrounding the lake are dead or dying as a result of higher water levels that occurred after the practice of draining the lake for agricultural purposes stopped.



LAKE CONDITIONS

■ ***Water Clarity***— Water clarity data for Lake Bryant are fairly sparse. Individual water clarity measurements ranged from 0.6 to 2.6 meters from 1994 and 2000, with most readings around 1 meter. Single measurements in 1974 and 1981 were less than 1 meter.

■ ***Color***— The lake is highly colored by dissolved organic (humic) material from surrounding wetlands, making the water very dark brown most years and reducing water clarity. Color measurements in 1994—the only year to average greater than 2.0 meters water clarity—were markedly lower than in 1974 or 1995.

■ ***Nutrients***— Summer total phosphorus concentrations in the epilimnion ranged from 18 to 36 $\mu\text{g/l}$ between 1996 and 2000, which is moderately high for Snohomish County lakes. One sample in 1974 showed a similar value; however a 1981 measurement was lower. Total phosphorus values in the hypolimnion were much higher, ranging from 32 to 97 $\mu\text{g/l}$ between 1996 and 2000. This indicates a substantial release of phosphorus from the bottom sediments during times of oxygen depletion. Total nitrogen concentrations measured in single 1974 and 1981 samples were high, suggesting that nitrogen is relatively abundant and that phosphorus availability is probably limiting algal growth.

- *Oxygen/Temperature* – Vertical profiles of temperature and dissolved oxygen from the summers of 1994 through 2000 show strong stratification between warm, oxygenated upper waters and cool, oxygen-depleted bottom waters. Typically, by late summer, dissolved oxygen is totally depleted below 2 or 3 meters depth. This indicates the presence of significant decaying organic matter in the lake bottom.
- *Algae* – Chlorophyll *a* data are limited. Four measurements taken in 1981 and 1994-1995 ranged from 5.5 to 13 µg/l, which indicates moderate to high levels of algae. Analysis of three algae samples from 1994 and 1995 revealed that dinoflagellates dominated by volume while blue-green algae were most abundant (ranging from 36% to 92% by count). Through the years, observations by SWM staff regularly noted moderate to high levels of algae in the water.
- *Aquatic Plants* – Because the dark water reduces light availability, aquatic plants are restricted to a narrow band of water up to 1 meter deep around the shoreline. Aquatic plants are concentrated in dense scattered patches within this zone. Bur-reed, pondweeds, and yellow water-lily—all natives—are the most common aquatic plants in the lake.

SUMMARY

- *Trophic State* – Based on low water clarity, high phosphorus concentrations, severe oxygen depletion and blue-green algal blooms, Lake Bryant may be classified as eutrophic.
- *Current Conditions/Trends* – Lake Bryant is in healthy condition for a eutrophic lake. The monitoring data for this lake are too limited to determine any statistical trends in water quality. However, water clarity observations have been fairly consistent from 1994 through 2000.
- *Future Concerns/Targets* – The lack of development directly on the lake shore is expected to continue due to the bog-like soils around the lake. The wetlands surrounding the lake should help filter inputs from the upper watershed if development increases. The potential for pollutants

from the closed sanitary landfill to leach into the lake is a concern. However, there are no data to indicate that this is occurring or will happen in the future. Maintaining current water clarity and phosphorus levels is the target for the lake.

- *Recommendations* – Monitoring of the lake should continue in order to determine if water clarity, nutrient levels, and algae remain stable and to identify any signs of possible pollutants coming from the landfill.

CITIZEN VOLUNTEERS

Thanks to Josh Shalan for volunteer monitoring of Lake Bryant.

DATA SUMMARY TABLE

Source	Date	Secchi Depth (meters)	Total Phosphorus (ug/l)		Color (Pt-Co scale)	Chlorophyll a (ug/l)
			Surface	Bottom	Epilimnion	Epilimnion
Bortleson, et al, 1976	8/6/74	0.6	29	33	160	-
Sumioka and Dion, 1985	7/7/81	0.9	10	10	-	11.4
SWM Staff or Volunteer	Summer 1994	1.6 - 2.6 (2.2) <i>n</i> = 4	-	-	80 - 90 (85) <i>n</i> = 2	5.5 - 6.4 (6.0) <i>n</i> = 2
SWM Staff or Volunteer	Summer 1995	1.2 - 1.3 (1.2) <i>n</i> = 3	-	-	120	13
SWM Staff	Summer 1996	0.6 - 0.7 (0.7) <i>n</i> = 2	29 - 31 (30) <i>n</i> = 2	53 - 73 (63) <i>n</i> = 2	-	-
SWM Staff	Summer 1997	0.8 - 1.1 (0.9) <i>n</i> = 2	26 - 36 (31) <i>n</i> = 2	47 - 97 (72) <i>n</i> = 2	-	-
SWM Staff	Summer 1998	1.9	18	43	-	-
SWM Staff	Summer 2000	1.1	22	32	-	-

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 1974 and 1981 averaged 1.34 mg/l in the epilimnion and 1.38 mg/l in the hypolimnion; this suggests that nitrogen levels are high and not limiting algal growth.
- **Alkalinity** – limited data from 1994 and 1995 ranged from 30 -- 43 mg/l CaCO₃, which suggests that Bryant has moderate buffering capacity.
- **pH** – 1994-2000 data averaged 7.1 near the surface and 6.4 near the bottom, which are near neutral values.
- **Conductivity** – 1994-2000 data averaged 91 µmhos in the epilimnion and 122 µmhos near the lake bottom, indicating moderately high levels of dissolved materials in the water compared to other Snohomish County lakes.
- **Iron** – limited 1994-95 data showed high levels in the epilimnion (avg. 740 µg/l) and the hypolimnion (avg. 1850 µg/l, high of 2500 µg/l), which indicates 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 high in two samples and that dinoflagellates were always most prevalent. Cell

counts of the same samples revealed that blue-green algae were most abundant, ranging from 37% to 92%.

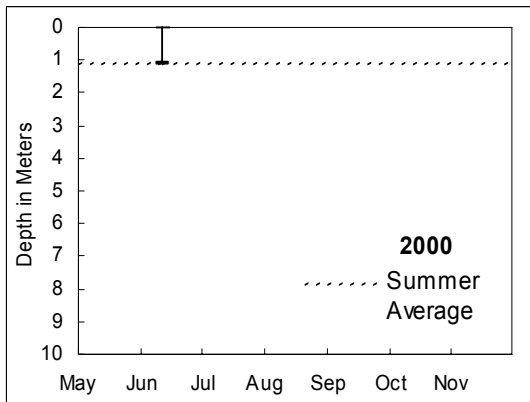
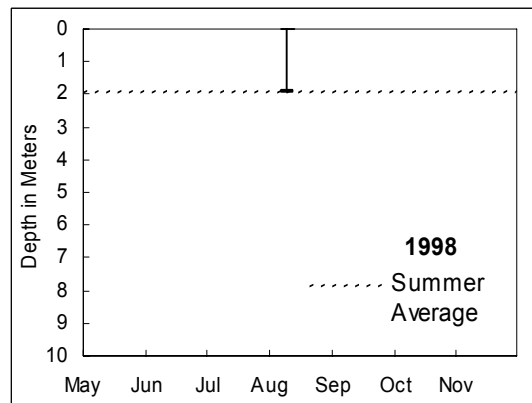
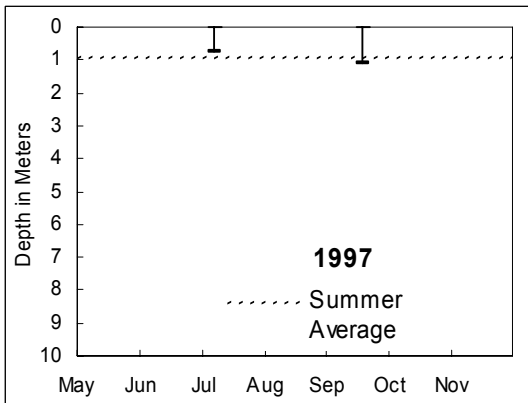
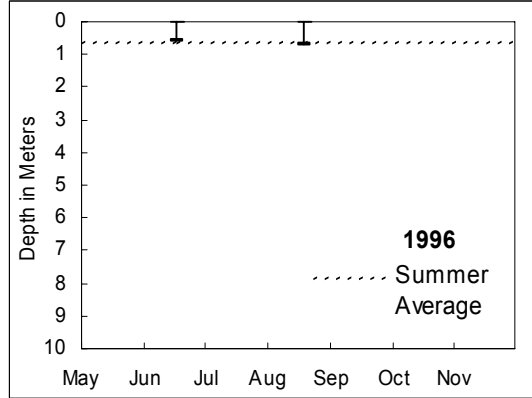
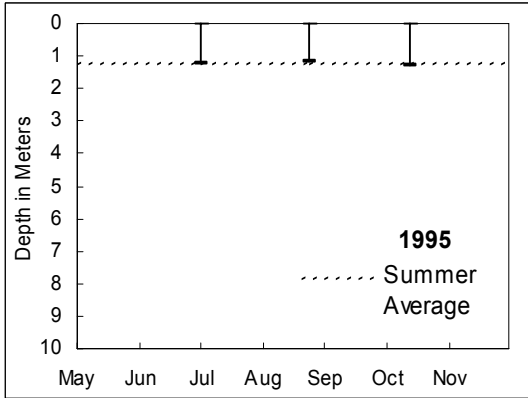
ALGAE TYPES	6/29/94	9/15/94	8/25/95
Cyanophyta (Blue-greens)	4%	4%	29%
Chlorophyta (Greens)	11%	15%	1%
Chrysophyta (Golden/diatoms)	8%	11%	11%
Cryptophyta (Cryptomonads)	0%	25%	5%
Euglenophyta (Euglenoids)	0%	3%	1%
Pyrrhophyta (Dinoflagellates)	77%	43%	52%
TOTAL BIOVOLUME (mm ³ /l)	2.032	0.58	3.443

- **Fish** – according to the Washington State Department of Fish and Wildlife (WDFW), fish species found in Lake Bryant include largemouth bass and black crappie.

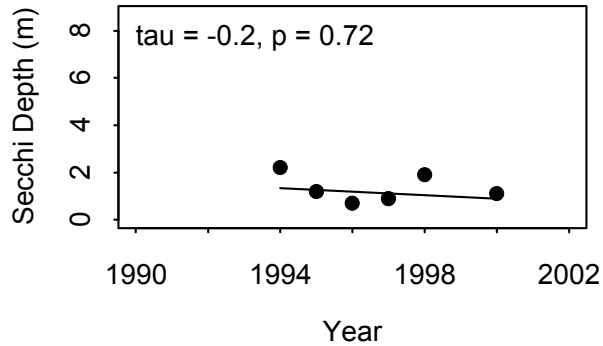
DATA SOURCES

In addition to data from Snohomish County SWM staff and citizen volunteers, data for Lake Bryant are also available from: Bortleson, et. al., 1976 and Sumioka and Dion, 1985. Please refer to the full list of references in the County-Wide Summary.

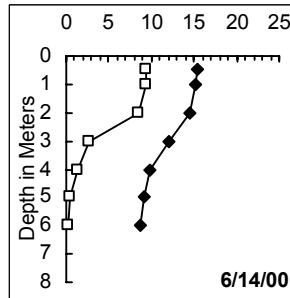
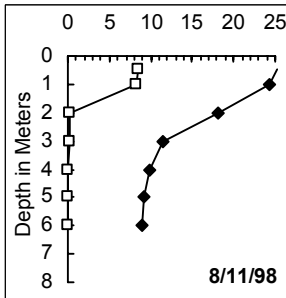
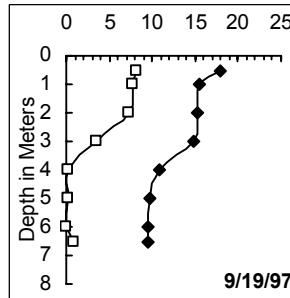
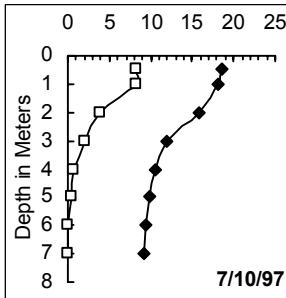
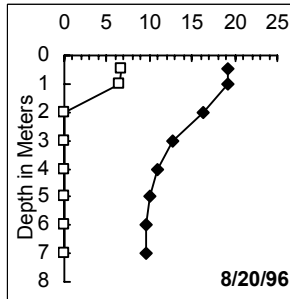
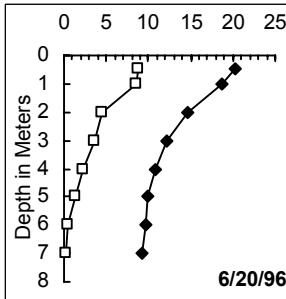
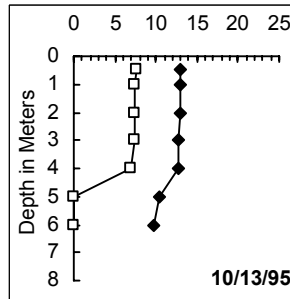
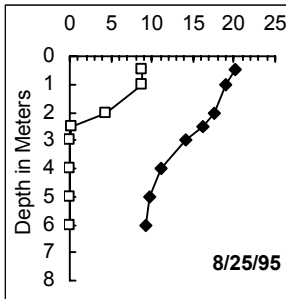
WATER CLARITY



TREND ANALYSIS

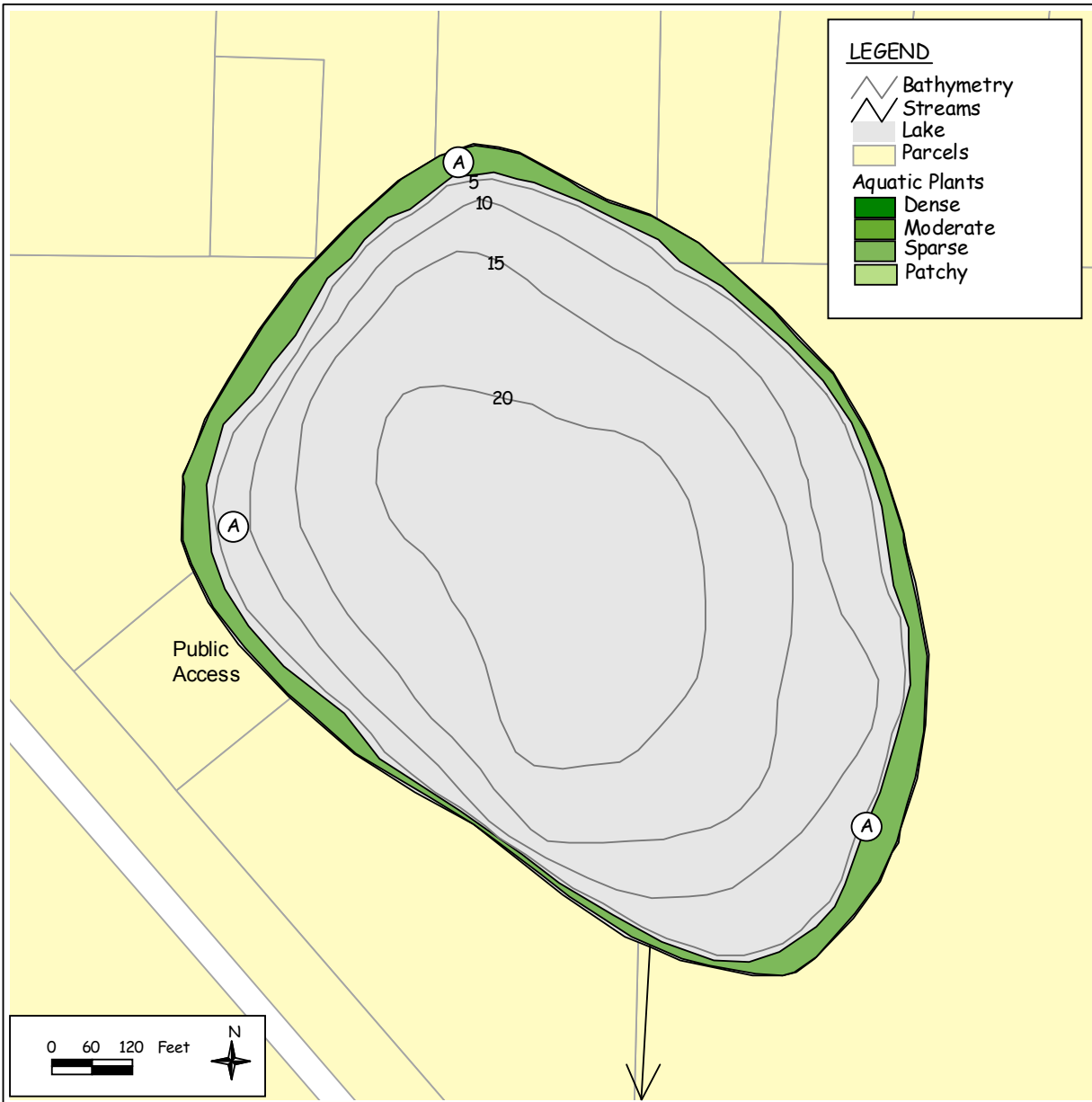


DISSOLVED OXYGEN AND TEMPERATURE PROFILES (SELECTED YEARS)



—□— DO (mg/l) —◆— Temp (°C)

AQUATIC PLANTS



Area	Density	Dominant Plants	Other Plants
A	Patchy	<i>Sparganium</i> sp. (Bur-reed) <i>Potamogeton epihydrus</i> (Ribbon-leaf pondweed) <i>Nuphar polysepalum</i> (Yellow water-lily)	<i>Chara</i> sp. (Stonewort, Muskgrass) <i>Potamogeton</i> spp. (Pondweeds) <i>Lemna minor</i> (Common duckweed)

Note: Most of the trees around the lake are dead or dying, probably because of higher water levels in recent years.

BASIC MONITORING DATA

1995									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*8/25/95	1.2				25	none	light	dk brown	Water level much higher (1-2 feet) than last year.
*10/13/95	1.3				100	moderate	breezy	dk brown	Plants mostly burreed and nuphar; few sprigs of chara near outlet. No other plants visible (no rake samples). Garbage.

1996									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*6/20/96	0.6				0	none	breezy	dkbrown	Lake level much higher this year than '94&'95 - therefore more wetland influence and darker water. A few nuphar, very few burreed - no other plants, water too dark.
*8/20/96	0.7				100	light	calm	dk brown	

1997									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*7/10/97	0.8				0	moderate	calm	dk brown	
*9/19/97	1.1				0	moderate	light	dk brown	

1998									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*8/11/98	1.9				0	none	light	dk brown	Slight odor in bottom sample. Water level about 2 feet lower than last year.

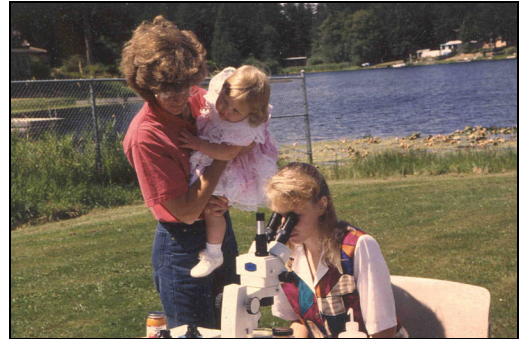
2000									
DATE	Secchi Depth (meters)	Air Temp (C)	Water Temp (C)	Lake Level (in)	Clouds (%)	Rain	Wind	Color	COMMENT
*06/14/00	1.1	18	15.4		75	moderate	light	dk brown	No ducks, heavy algae, no algae scum, and slight aquatic plants.

*Indicates data collected by Snohomish County staff.

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

HOW YOU CAN HELP LAKE BRYANT

- 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 Bryant.

(TTY users call 425-388-3700)